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Bibliography on Thunderstorm Sferics

April 1959 No. 4

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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A. Current Abstracts in English on important meteorological literature in every language.

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 10 APRIL 1959 No. 4

SPECIAL FEATURE IN THIS ISSUE

Bibliography on Thunderstorm Sferics

By
Geza Thuronyi

(*For complete table of contents see back cover*)

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LIST OF PERIODICALS

Note: This list contains the titles of the periodicals which regularly contain material on meteorology or related fields and it comprises only a small percentage of the periodicals from which pertinent articles are abstracted. The form of serial entry adopted by MAB is given in bold face type below.

PERIODICALS IN WHICH METEOROLOGICAL ARTICLES REGULARLY APPEAR

★**Acta Geophysica Polonica,** [Warsaw].
Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. and **Ser. Geofiz.,** [Moscow].
American Geophysical Union, Transactions, [Washington].
★**American Meteorological Society, Bulletin,** [Boston].
★**Angewandte Meteorologie,** [Potsdam].
★**Annalen der Meteorologie,** [Hamburg].
Annales de Géophysique, Centre National de la Recherche Scientifique, [Paris].
★**Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A and Ser. B,** [Vienna].
Australian Journal of Physics, [Melbourne].
★**Australian Meteorological Magazine,** [Melbourne].
★**Ciel et Terre,** Société Belge d'Astronomie, Météorologie et Physique du Globe, [Brussels].
★**Geofisica e Meteorologia,** Società Italiana di Geofisica, [Genoa].
Geofisica Pura e Applicata, Istituto Geofisico Italiano, [Milan].
★**Geophysical Magazine,** Japan Meteorological Agency, [Tokyo].
Hemel en Dampkring, [The Hague].
★**Időjárás,** Magyar Meteorológiai Társaság and Országos Meteorológiai Intézet, [Budapest].
★**Indian Journal of Meteorology and Geophysics,** [Delhi].
★**Journal of Atmospheric and Terrestrial Physics,** [London].
Journal of Geophysical Research, [Washington].
★**Journal of Meteorological Research,** [Tokyo].
★**Journal of Meteorology,** American Meteorological Society, [Boston].
★**Journal Scientifique de la Météorologie,** Société Météorologique de France, [Paris].
★**The Marine Observer,** Air Ministry, Meteorological Office, London.
★**The Meteorological Magazine,** Air Ministry, Meteorological Office, London.
★**Meteorologické Zprávy** [Prague].
★**Meteorological Society of Japan, Journal,** [Tokyo].
★**La Météorologie,** Société Météorologique de France, [Paris].
★**Meteorologiia i Gidrologiia,** [Leningrad].
★**Meteorologische Rundschau,** [Berlin].
★**Monthly Weather Review,** U. S. Weather Bureau, Washington, D. C.
Polarforschung, Archiv für Polarforschung, [Kiel].
★**Przegląd Geofizyczny,** [Warsaw].
Revista de Geofísica, Instituto Nacional de Geofisica, [Madrid].
★**Rivista di Meteorologia Aeronautica,** Servizio Meteorologico, [Rome].
★**Royal Meteorological Society, Quarterly Journal,** [London].
★**South Africa, Weather Bureau, Notos,** [Pretoria].
★**Tellus,** Svenska Geofysiska Föreningen, Stockholm.
Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia, [Leningrad].
★**Weather,** Royal Meteorological Society, [London].
★**Weatherwise,** American Meteorological Society, [Boston].
★**Wetter und Leben,** Österreichische Gesellschaft für Meteorologie, [Vienna].
★**WMO Bulletin,** World Meteorological Organization, [Geneva].
★**Zeitschrift für Meteorologie,** Meteorologisches Observatorium, Potsdam.

★ Indicates those periodicals which are primarily meteorological.

FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to ing to the attention of meteorologists current literature in their field.

Part I contains abstracts of current literature in the fields of meteorology, etc.

Part II of each issue comprises an annotated bibliography of important references on a ecial subject (usually arranged chronologically).

Bibliographies published in the successive issues were:

Vol. I, 1950

Atmos. Pollution	2. Aerobiology	3. Cloud Physics	4. Hail
Tornadoes	6. Volcanic Dust	7. Climat. Changes	8. Thunderstorms
Icing	10. Acoust. Propagation	11. Evaporation	

Vol. II, 1951

Extended Forecast.	2. Long Range Forecast.	3. Soil Temp.	4. Constants, etc.
Clim. of Near East	6. Clim. of Middle East	7. Special Winds	8. Radar Storm
Condensation Trails	10. Clim. of N. E. Africa	11. Mountain Met.	Detect.

Vol. III, 1952

Clim. of N. W. Africa	2. Carbon Dioxide	3. Clim. of Argentina, etc.	4. Dew
Objective Forecast.	6. Stratus Forecast.	7. Urban Climatology	8. Clim. of C. Africa
Visibility	10. Glaze and Rime	11. Free Air Turbulence	

Vol. IV, 1953

Turbulence Theory	2. Turbulent Diffusion	3. Frost	4. Clim. of Australia, etc.
High Level Winds	6. Winds in Stratosphere	7. Jet Stream	8. Radiation Bioclim.
Clim. of Pacific	10. Auroras	11. Sferics	

Vol. V. 1954

Oceanog. Met.	2. Clim. of S. E. Asia	3. Auroral Physics	4. Tropopause
Balloons	6. Numerical Forecast.	7. Radiation Data	8. Vertical Motion
Clim. of Arctic	10. Industrial Met.	11. Wind Waves and Swell	

Vol. VI, 1955

Bibliog. of Bibliog.	2. Texts & Monogr. Bibliogs.		3. Storm Surges
Ionospheric Prop.	5. Photochem.—Upper Atmos.		6. Cloud Physics
Radar Cloud Physics	8–9. Atmos. Nuclei	10. Weather Modification	11. Cooling Power

Vol. VII, 1956

Synoptic Met.-Arctic	2. Clim. of Enclosed Spaces	3. Cosmic Rays (–1952)
Cosmic Rays (1953–56)	5. Atmos. Radioactivity	6. Inversions
Snow Micromet.	8. Snow Micromet. (Suppl.)	9–11. Tropical Cyclones

Vol. VIII, 1957

Solar Weather Relations	2. Night Airglow	3. Forecasting Special Elements
Forest Micrometeorology	5. Hydromet. Forecasting	6. Numerical Forecast. (Suppl.)
Albedo 8. Meteors	9–10. Tropospheric Prop.	11. Medical Meteorology

Vol. IX, 1958

Radioastronomy	2. Solar Astrophysics	3. Radioactivity in Atmosphere
Waves and Currents	5. Physical Oceanog.	6. Dynamic & Phys. Oceanog.
Long Range Forecast.	8. Radar Met. 9. Cosmic Rays	10–11. Geomagnetism

Vol. X, 1959

Works of C. E. P. Brooks	2. Tornado forecasting	3. Soil Moisture	4. Sferics

Other bibliographies in preparation are:

Actinometers	*Micrometeorology*	*Singularities*
Frost	*Ozone*	*Synoptic Aerology*
High Atmosphere Temperatures	*Radiation*	*Thunderstorms*

Part III contains a listing of reviews, translations, reprints, and the contents of important lications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. The December issue prises cumulative author, subject, geographical and journal indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DNLM:	U. S. National Library of Medicine, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts

Geographic locations are in the English form rather than the form used locally, for example Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

MAJOR GENERAL WORKS

COLLECTED WORKS

See also: **Soviet ice floe stations** (Burkhanov), 10.4–16.

10.4–1 551.582.2(497.2) 551.578.46(497.2)

*Bulgaria. Khidrometeorologichna Sluzhba, [**Collection of articles on the climate of lgaria,** ed. by L. Krŭstanov]. Its *Trudove* [Publications], Vol. 4, issued Sofia, **1955.** 3 p. figs., charts in pocket (colored), tables. A collection of articles by D. Angelov, Blŭskova, R. N. Kalcheva, E. Khershkovich, K. (T.) Kirov, M. Kiuchukova, L. Krŭstanov, Lingova, M. Stanev, B. Staneva, and L. Sŭbev. **DLC** (QC851.B922)—This large volume an edition of 480 copies) contains a collection of 13 statistical climatological papers on the nual and regional variations in pressure, wind, temperature, frost, absolute humidity, snow ver, cloudiness, sunshine, cloud-sunshine correlation, thunderstorms, and complex clima- ogy of Bulgaria. At least 20 or 30 yrs of records are used, from scores of stations wherever ssible, and the original data included in extensive tables as well as in illustrative tables d graphs, maps, wind roses, statistical curves, etc. The two articles on snow cover in lgaria, one by B. STANEVA (p. 213–270) and one by E. KHERSHKOVICH (p. 271–327), are ecially comprehensive, taking up not only the first and last dates of snow cover, but also e days of continuous snow cover, frequency of months without snow cover, the mean, mean ximum and absolute maximum depth of snow, number of days and depth of snow by decades, ter content of snow, frequency of duration of snow cover by decades, frequency of snow pth by decades, and snowfall, wind roses (on chart), effect of height above sea level on ow cover, beginning and ending and on depth (0–2500 m elev.), relation between mean nthly temperature and snow cover (the latter on scatter diagrams), etc. A series of colored arts show the cloudiness distribution in Bulgaria in different months. *Subject Headings:* **Climate of Bulgaria 2. Snow cover in Bulgaria 3. Bulgaria.**—*M.R.*

10.4–2 551.513(08)

Massachusetts Institute of Technology. Dept. of Meteorology, **Studies of the At- spheric General Circulation II.** Contract AF 19(604)-1000, General Circulation Project, nal Report, Dec. 31, 1957. 672 p. figs., tables, refs., eqs. "Consists principally of the lected published papers by members of the project, with the addition of several new studies t yet published" (30 in all). (For listing of papers, *see* Pt. III, p. 1178, Sept. 1958, *MAB.*) articles abstracted separately. **DWB**—The works consist of 3 general, 15 observational d 12 theoretical studies. The observational studies cover the methodology, energetics of neral circulation, and water vapor considerations in a hemispheric scale. The theoretical dies cover stability of systems, meridional circulation, numerical prediction models and ner modifications of the hydrodynamic equations to include energy and water vapor thermo- namic processes or transformations. Ozone transfer is also included among the studies. or similar compilation of papers under earlier contract, *see* 6.7–3, July 1955, *MAB.*) *Subject adings:* **1. General circulation studies 2. MIT General Circulation Project.**—*M.R.*

10.4–3 551.510.7(08)

†United Nations. General Assembly. Scientific Committee on the Effects of Atomic diation, **Report of the . . . Committee.** *United Nations. General Assembly, Official cords, 13th Session, Supplement No. 17; United Nations* [*Document*] A3838, **1958.** 228 p. ., tables, refs., eqs. Review in *Nature,* London, 182(4649):1543–1545, Dec. 6, **1958.**

DLC—This extensive report was prepared on the basis of over 200 documents submitted to th Committee by various national governments and agencies, and ranging in size from 1 to 2000 p The report contains numerous data and calculations and close to a thousand literature refer ences, along with the Committee's evaluation. The subject range includes the entire fiel of radiation from natural and artificial sources, environmental and large-scale contaminatio (fallout mechanism), methods of measurement and radiobiological aspects. After carefu examination of all types of radiation exposure, including the different types of fallout, th committee concludes that "all present attempts to evaluate the effects of sources of radiatio to which the world population is exposed can produce only tentative estimates with wid margins of uncertainty," but "even the smallest amounts of radiation are liable to caus deleterious genetic, and perhaps also somatic effects." Estimated amounts of the relativ magnitude of exposure due to each type of radiation are tabulated. *Subject Headings:* **1. Radia tion effects 2. Biological effects of atomic radiation.**—*G.T.*

10.4–4 551.1(08

Scientific American, N. Y., **The planet earth.** N. Y., Simon and Schuster, **1957.** 168 p figs., bibliog. p. 165–168. All articles reprinted from **Scientific American,** from Oct. 195 through Dec. 1955. **DLC** (QC806.S37)—This book contains a series of popular articles o the genesis of the earth, the nature of the core and mantle, the crust, the hydrosphere, th atmosphere and the edge of space and satellite. In the chapter on the **Hydrosphere** (Ch. 4 p. 95–112) is an article on glaciers by WILLIAM O. FIELD, and on the Circulation of the Ocean by W. H. MUNK; and in the chapter on the Atmosphere (Ch. 5) there are 4 articles: one o the circulation of the atmosphere by HARRY WEXLER, one on the ionosphere by T. N. GOUTIER one on aurora and airglow by C. T. ELVEY and F. E. ROACH and one on whistlers by L. R. C STOREY. Ch. 6, on the satellite project, is by HOMER E. NEWELL. A few schematic diagram are included. Brief biographies of the authors are given. (Most of these articles abstracte from original source.) *Subject Headings:* **1. Earth 2. Atmosphere.**—*M.R.*

TEXTBOOKS

10.4–5 551.590.21(02

†Eĭgenson, Moris Semenovich, **Ocherki fiziko-geograficheskikh proiavleniĭ solnechno aktivnosti.** [Notes on physico-geographic effects of solar activity.] Lwow, Izdatel'stv Universiteta, **1957.** 229 p. 40 figs., bibliog. p. 224–229. At head of title page: MVO USSR L'vovskiĭ Gosudarstvennyĭ Universitet im. Iv. Franko. **DLC** (QB531.E35) (4000 copies)— The basic knowledge and theories regarding the sun and its effect on the general atmospheri and oceanic circulation are treated in Pt. I in a nonmathematical style; and separate chapter in Pt. II cover the 5–6 year, the 11 year, the Bruckner, the 100 year (secular) and the man century cycles and their correlation with geophysical phenomena, the effect of sun's longitud and of superposition of cycles. In Pt. III are 9 chapters on Heliogeophysics: effect of sola activity on solar constant, climatic fluctuations, hydrologic phenomena, Caspian Sea level Arctic ice, Paleoclimates, general circulation in 1954–56, geologic phenomena, and on th biosphere, respectively. Only graphic (no tabular) evidence is given to support statement taken from extensive literature on the subject. *Subject Headings:* **1. Solar-terrestrial relation ships 2. Textbooks on solar relations.**—*M.R.*

10.4–6 551.594:551.508.94(02

†Imianitov, Il'ia Moiseevich, **Pribory i metody dlia izucheniia elektrichestva atmosfery** [Instruments and methods for the study of atmospheric electricity.] Moscow, Gosud. Izdat Tekhniko-Teoreticheskoĭ Literatury, **1957.** 483 p. 342 figs., 8 tables, 613 refs., eqs. **DWI** (M94 I32pr) (3000 copies.)—A systematic covering of the voluminous world literature on a phases of measurements of atmospheric electricity from 1900 to 1956, including chapters on 1) mechanical electrometers, 2) tube electrometers, 3) ionization measurements, 4) measure ments of electrostatic fields in atmosphere, 5) concentration and movement of ions, 6) charge on particles, 7) conductivity, 8) exchanges of charges, 9) electric currents, 10) dielectric condi tions, 11) thunderstorm electricity and sferics, 12) ionospheric and outer atmosphere research All chapters deal with theory, instrumentation and observations pertaining to the phenomen

n the atmosphere. Such special subjects as radioactivity of rain and in atmosphere, light and ieavy ions, airplane and balloon instruments, etc. are covered. Scores of photos, line drawings ind recorder records illustrate methods and equipment. *Subject Headings:* **1. Atmospheric electricity instruments 2. Instrument textbooks 3. Textbooks.**—*M.R.*

10.4–7 551.593.64:523.75(02)

*†Waldmeier, Max, **Die Sonnenkorona.** [Sun's corona.] Basel, Birkhäuser Verlag, 1951–1957. 2 vol. Vol. 1 (1951), **Beobachtungen der Korona 1939–1949.** 270 p. 12 figs., numerous diagrs., 43 refs. Vol. 2 (1957), **Struktur und Variationen der monochromatischen Korona.** 353 p. 299 figs., 30 refs. (*Lehrbücher und Monographien aus dem Gebiete der Exakten Wissenschaften: Astronomisch-geophysikalische Reihe*, Vol. 4–5.) **DLC** (QB529.W3). Review by H. H. Voigt in *Die Naturwissenschaften*, Berlin, 45(10):251, May 15, **1958.** Review by R. Coutrez in *Ciel et Terre*, Uccle, 73(9/10):471–472, Sept./Oct. **1957.** Review by R. O. Redman in *Nature*, London, 181(4613):871, March 29, **1958.** Review by M. A. Ellison in *Journal of Atmospheric and Terrestrial Physics*, London, 12(1):87–88, **1958.**—In these two volumes, the astrophysical observatory on the Tschuggen (2050 m) near Arosa, Switzerland, is described and illustrated. The coronograph and mounting, the spectroscope, its use and calibration, the corona diagrams made daily or twice daily from 1939–1949, data on 5303–5374 Å lines observed in the corona, and their spectral and temporal variations, monochromatic coronal condensations, isophotes, polar charts, and heliographic charts of the corona are discussed and illustrated, with extensive data presentations in tabular and graphic form. Vol. III will contain an analysis of data obtained on the Sudan Eclipse Expedition of Feb. 25, 1952. *Subject Headings:* **1. Sun's corona 2. Coronograph observations 3. Tschuggen Astrophysical Observatory 4. Arosa, Switzerland.**—*M.R.*

MONOGRAPHS AND COMPREHENSIVE PAPERS

See also: **Ocean-atmos. interaction, Japan** (Takahashi), 10.4–69; **Met. instruments and applied met.** (Bellamy), 10.4–115; **Atmospheric electricity** (aufm Kampe), 10.4–306.

10.4–8 551.501.5:551.521.1:551.581

*Bernhardt, Fritz and Philipps, H., **Die räumliche und zeitliche Verteilung der Einstrahlung, der Ausstrahlung und der Strahlungsbilanz im Meeresniveau, Teil 1, Die Einstrahlung.** [Spatial and temporal distribution of incoming and outgoing radiation and the radiation balance at sea level, Pt. 1, Incoming radiation.] *Germany. Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, Abhandlungen*, No. 45, **1958.** 227 p. numerous figs. and tables, 25 refs., 61 eqs. **DLC.** Review by Gabriella Endrödi in *Időjárás*, 62(4):242–243, July–Aug. **1958.**—Time cross-sections show calculated values of mean 1) extraterrestrial radiation: W_0 from 90°N to 90°S for Jan.–Dec.; 2) Rayleigh-radiation: $\bar{W}$, and 3) Relative diminution in extraterrestrial radiation through a Rayleigh atmosphere: $\frac{W_0-\bar{W}}{W_0}100\%$. Hemispheric charts for the year and for each month show isopleths of direct solar radiation, considering turbidity but without cloudiness: W'; and direct solar radiation with turbidity and cloudiness taken into consideration: W''. Charts are presented for both hemispheres and values are also shown on latitude time cross section 70°N to 60°S. Similar charts show sky radiation with cloudiness: W_i; energy received by the earth's surface due to global radiation (including albedo) G^*; followed by meridional sections of W_0, W, W', and W''; and of W_i and G^*. Theory is developed, data used discussed, and basic data presented in tabular form. Pt. II will contain similar data for 3 long wave parameters; incoming, outgoing and radiation balance. *Subject Headings:* **1. Radiation charts for earth 2. Radiation data for earth.**—*M.R.*

10.4–9 551.585(728)

*Chambers, Jack V. and Blaut, James M., **Analogs of Canal Zone climate in Middle America (Canal Zone Analogs, No. 1).** *U. S. Quartermaster Research and Engineering Center. Environmental Protection Research Div., Technical Report*, EP-87. April, **1958.** 20 p. 15

charts, 11 tables. **DWB** (M86 U585t)—Climatic analogs of Cristobal and Balboa Height in the Panama Canal Zone and other places in Central America, Mexico, the Caribbean an southern U. S. are shown on large color charts and are discussed, with the basic data tabulated A general description of the climate of Middle America and the Canal Zone, respectively, ar given. Graphs of the annual course of temp., precip., rainy days, sunshine, relative humidit and wind are given for both Canal Zone stations. Analog maps cover mean temp. of th warmest and coldest month, mean max. and min. temp. of warmest and coldest month, re spectively; mean daily range of warmest month, mean annual precip., mean precip. of wettes month and number of wet months, humidity of driest month, cloudiness and wind speed c wettest month are given for individual stations only, not for areas. Several maps sho combination of elements in analogs. *Subject Headings:* **1. Climatic analogs of Canal Zon 2. Middle America 3. Cristobal C. Z. 4. Balboa Heights, C. Z.**—*M.R.*

10.4–10 551.585(98

*†Falkowski, Sigmund J., **Climatic analogs of Fort Greely, Alaska, and Fort Churchil Canada, in Eurasia.** *U. S. Quartermaster Research and Engineering Center. Environmenta Protection Research Div., Technical Report,* EP-77, Dec. **1957.** 37 p. 15 charts, 13 table 48 refs. **DWB** (M86 U585t)—The basic data for Fort Greely, Alaska, and Fort Churchil Canada, are presented in tables and charts, along with data for comparable places in Europ and Asia. Analogs are shown by colored or striped bands which may or may not overla Most of the analogs are in Scandinavia, Northern U.S.S.R. (and Siberia). The element considered separately or in composite maps are: mean temp. of coldest and warmest month absolute max. and min. temp., mean windchill and cloudiness of coldest and warmest month mean snow depth of deepest months, mean annual precip., humidity and fog. Monthl values are given in tables for all of these elements for about 30 stations (mostly in U.S.S.R. Charts are on large, folded maps and there is a good bibliography appended. In the "Col Pole" area of Siberia there is no analog, as it is much too cold. Narrow bands around thi "Pole" are analogous in some respects to the Alaska and Canada test sites, but only limite areas have analogs for 2 or 3 of the elements simultaneously. *Subject Headings:* **1. Climati analogs 2. Wind chill data 3. Climate of U.S.S.R. 4. Fort Greely, Alaska 5. Fort Churchil Manitoba 6. U.S.S.R.**—*M.R.*

10.4–11 551.511:551.558.1:632.18

Scesa, S., **Transfer of heat by forced convection from a line combustion source: the in fluence of atmospheric stability and surface roughness.** *U. S. Forest Service. Californi Forest and Range Experiment Station, Interim Technical Report AFSWP-865,* Feb. **1957** 40 p. 15 figs., 9 refs., 58 eqs. **DWB** (M11 U581tr)—Fundamental equations of conservatio of mass, momentum, and energy are applied to the problem of heat transmission by force convection from a line combustion source. The influence of atmospheric stability and surfac roughness on growth of the heated zone, decay of temperature downstream from the hea source, and aerodynamic drag is presented. Theory is general, being based on the edd diffusivity for momentum given by DEACON (2) which is $K_m(z) = kv_\infty \left(\frac{u \times z_0}{v_\infty}\right)\left(\frac{z}{z_0}\right)^B$. Edd diffusivity for heat is taken as equal to that for momentum. Theory presents groupings of th variables that are common to heat transfer and fluid flow problems concerning the surfac air layer. Results reveal that atmospheric stability plays an important role in the growt of the heated region, decay of temperature, and aerodynamic drag for small values of frictio velocity and macroviscosity parameter. For large values of these parameters (large surfac roughness), atmospheric stability is not important. *Subject Headings:* **1. Forced convectio 2. Stability effects on fires 3. Fire spreading.**—*Author's abstract.*

10.4–12 551.584.2(747) 551.551:551.507

Singer, Irving A. and Raynor, Gilbert S., **Analysis of meteorological tower data, Ap 1950–March 1952, Brookhaven National Laboratory.** *U. S. Atomic Energy Commissio (Report)* BNL-T, 102, June **1957.** 93 p. 86 figs., forms. (ASTIA Document AD 13380 AFCRC-TR-57-220.) Price: $2.75 from Office of Technical Services, Dept. of Commerc

Wash., 25, D. C.—Installation and surroundings at Brookhaven are described, origin and accuracy of data and analytical procedures discussed, and a detailed analysis of hourly temperatures, wind, wind and temperature data for 6 levels from a 420 ft meteorology tower, and upper air data are presented. Appendices describe punch card data and IBM, Remington Rand and answer card decks. The local climate and topography are described, data and analysis procedures discussed, and the wind and temperature data correlated with geostrophic winds, cloudiness, lapse rates and gustiness. Data are presented mainly in form of graphs, histograms and time cross-sections. *Subject Headings:* **1. Micrometeorological data analysis 2. Micrometeorological turbulence 3. Tower observations 4. Brookhaven, N. Y. I. U. S. Brookhaven National Laboratory.**—*M.R.*

10.4–13 551.524.4(792)

*Thompson, Aylmer and Dickson, Charles Ray, **Ground layer temperature inversions in an interior valley and canyon.** Utah. Univ. Dept. of Meteorology, Contract DA-19-129-QM-399, Final Report, Aug. 30, **1958.** 194 p. 59 figs., tables, 36 refs. **DWB** (M25.2 U89gr)—A climatological study of the surface air layer of the Salt Lake Valley showed that inversions are frequent and important factors in the temperature structure over the valley. Radiosonde reports from the Salt Lake Airport near the center of the valley gave a fairly detailed picture of the developments of inland inversions over the valley floor, but offered no information as to the nature of the temperature structure near the rim of the valley. As an aid in correcting this deficiency, a set of stations, including a special automatic temperature recording network, was established in and near the mouth of a canyon opening into the valley from the east. Analysis of the data showed that mountain inversions formed quite rapidly and strongly as a result of pre-cooling of the surface layer in sheltered locations within the canyon. Once formed, the inversion, in the simpler cases, showed little change because adiabatic heating of the down-valley wind compensated for the radiational cooling. Dissipation occurred simply as a result of heating from below. With cloud cover or windy conditions, the inversion formed much less rapidly and its features were less pronounced. Inversions similar to those in the canyon opening into the Salt Lake Valley probably form nearly anywhere in mountainous terrain when the synoptic conditions are favorable. This would be an appreciable percentage of the time in most favorable locations. *Subject Headings:* **1. Temperature inversions 2. Surface inversions 3. Salt Lake Valley, Utah.**—*Author's abstract.*

POPULAR SCIENCE BOOKS

See also: **The planet earth, 10.4–4; Soviet satellites, 10.4–77.**

10.4–14 551.5:91.04(99)

U. S. Navy. Task Force 43, **Deepfreeze, 1955–1956: the chronicle of Task Force 43 and its service to science in the first phase of a project of four years' duration.** Narrative by Joseph E. Oglesby. Paoli, Pa., Dorville Corporation, **1956.** 202 p. Mostly photographs with legends. **DWB** (919.9 T585op)—The activities of the U. S. Navy Task Force and of Navy aerographers in the support operations for IGY or pre-IGY stations in the Antarctic are briefly described and vividly depicted by hundreds of photos selected from thousands taken in the first phase of the operation. The IGY 1957–58 program is outlined and stations shown in a color map, leaders are shown (Byrd, Dufek and other leading Navy men), advance planning, ships, planes, housing, transportation, meteorological personnel and operations, supply, voyage south, etc. are described and shown with action pictures, many in color. *Subject Headings:* **1. Operation Deepfreeze 2. Antarctic IGY program.**—*M.R.*

10.4–15 551.58

Andreev, Boris Mikhaĭlovich, **Klimat.** [Climate.] Moscow, Gos Izd-Vo Tekhniko-teoret. Lit-Ry, **1957.** 47 p. figs., 9 tables. (*Nauchno-Populiarnaia Biblioteka*, No. 16.) **LC** (QC981.A55)—A popular pamphlet (50,000 copies) discussing climate and weather, the factors controlling climate, climatic processes, microclimate, topo- or local climate, climatic changes, and the possibility of controlling climate. A few schematic diagrams, tables, weather

maps, and illustrations enhance the text. Applications of climatic science and data to agri-culture, air transport, industry, medicine, etc. are stressed; especially the uses in irrigation reclamation, shelter belt protection of soil and snow conservation. *Subject Headings:* **1. Popular climatology 2. Applied climatology.**—*M.R.*

10.4–16 551.501.9(987):551.311.184 551.507.2:551.506.5

Burkhanov, Vasiliĭ F. (*ed.*), **Cherez okean na dreĭfuiushchikh l'dakh.** [Across the ocean on drifting ice.] Moscow, Gosud. Izdatvo. Geograficheskoĭ Literatury, **1957.** 381 p. map (fold.), numerous figs. **DLC** (G630.R8B828)—A popular science book consisting of short articles by eleven different authors on various phases of the Soviet drifting stations in the Central Artic. In the first article, V. F. Burkhanov describes the overall achievements of Russian geographical expeditions in the Arctic from 1641–1956, with photographs of explorers ships, planes, stations, etc., charts showing drift of ice and stations, specific results in meteorology (p. 39–41), oceanography (p. 41–42), and geophysics (p. 42–44), ice (p. 45–46) and new techniques in Arctic scientific research (p. 46–49). I. D. Papanin gives an account of the first Arctic drifting station (p. 50–65). E. T. Krenkel' describes experiences at the North Pole on the 1937–38 expedition (p. 66–100). M. M. Somov, leader of the 1950–51 drifting station accounts for similar work during 376 days on that expedition (p. 101–137). A. I. Shcherbakov (p. 138–158) and F. Treshnikov (p. 159–197) give vivid descriptions of life and work on later expeditions (1954–55). V. G. Kanaki describes meteorological and aerological observations (p. 198–230), as does E. I. Tolstikov (p. 231–246) for the 1954–1955 expedition. M. V. Izvekov (p. 247–282) describes hydrological work on the "Severnyi Polius" 4 Expedition (1954–55). P. A. Gordienko (p. 283–311), leader of the "Severnyi Polius" 4 Expedition (1955–56), gives further details of the continuation of the 1954–55 expedition. N. A. Volkov leader of the "Severnyi Polius" 5 Expedition (1955–56) recounts hydrological and oceanographic work on that drifting station. *Subject Headings:* **1. Soviet ice floe stations 2. Arctic drift expeditions 3. Arctic Basin. I. Papanin, I. D. II. Somov, M. M.**—*M.R.*

10.4–17 551.5(023)

Fisher, Robert Moore, **How about the weather?** Rev. ed. Foreword by Enest J. Christie. N. Y., Harper, **1958.** 172 p. 8 maps, 16 plates, 23 refs. **DWB, DLC**—Earlier editions have been greatly revised to include a large amount of literary material as well as recent scientific findings regarding the jet stream, hurricanes, long range forecasts, hailstorms, snowflakes etc. After a general and an historical chapter, there are chapters on the atmosphere, temperature, clouds, pressure and circulation, air masses, fronts, newspaper weather maps, fog winds and storms, official and amateur forecasting; and appendices giving systematic rules for local forecasting and references to books, articles and facts about weather and climate. A good subject index is also appended. Excellent scenic cloud photos are included. (For abstract on first ed. (1951), *see* 2.9–9, Sept. 1951, *MAB*; for revision with title **How to know and predict weather** (1953), *see* 5.6–86, June 1954, *MAB.*) *Subject Headings:* **1. Popular meteorology 2. Meteorology in literature.**—*M.R.*

MANUALS, ATLASES, AND HANDBOOKS

See also: **Space encyclopedia & astronautical glossary,** 10.4–73; **Wind atlas, N. Pacific** (McGary, Naito), 10.4–233.

10.4–18 551.5:655.4/5(02)

Iasnogorodskaia, Margarita M., **Spravochnik dlia avtora i redaktora.** [Handbook for authors and editors.] Leningrad, Gidrometizdat, **1957.** 217 p. figs. **DLC** (PN147.13) Review by N. V. Sagatovskiĭ in *Meteorologiia i Gidrologiia*, Leningrad, No. 4:57–59, Apr **1958.**—A textbook or handbook prepared specifically for authors and editors of hydrometeorological publications. General problems of titles of parts, sections, chapters and paragraphs preparation of tables of contents, illustrations, tables, references, bibliographies, formulas graphic material, maps, diagrams, photographs, with respect to preparation of hand written copy for typing, and typed copy for the printer with numerous examples are presented. Instructions for authors and editors in connection with editing of manuscript and galleys, ortho

graphic instructions, abbreviations, printing of books (type fonts to use), printing or type-setting techniques, linotype and monotype setting up of formulas, press work, corrections and other details of publishing are included. Numerous appendices give symbols, alphabets, weather code symbols, constants, abbreviations, etc. *Subject Headings:* **1. Meteorological publishing 2. Editorial manuals.**—*M.R.*

10.4–19 551.511 551.509.312 551.551

†Eliassen, A. and Kleinschmidt, E., Jr., **Dynamic meteorology.** *Handbuch der Physik*, Berlin, 48:1–154, **1957.** 41 figs., numerous foot-refs., bibliog. p. 154 (23 refs.), numerous eqs. **DWB** (551.03 N236)—Although only one of 17 articles in the second volume of the Geophysics section of the **Handbook of Physics,** this article constitutes a major treatise on dynamic meteorology. It condenses into 150 pages the basic theory of physical meteorology, hydrodynamics, statics, equilibrium states and turbulence of the atmosphere; the theory of adiabatic and frictionless motion, stability and theory of small scale oscillations and waves in zonal currents, etc.; nonlinear prognostic equations for large scale motions (filtering approximations, and simplified atmospheric models for numerical prediction); a full discussion of cyclone and anticyclone theory and of the general circulation. The work is well edited and on slick paper, with nice illustrations and schematic diagrams. (*See also* 8F–152, June 1957, *MAB.*) *Subject Headings:* **1. Dynamic meteorology 2. Numerical forecasting models.**—*M.R.*

10.4–20 551.573:912

†Ivanov, Nikolaĭ N., **Mirovaia karta ispariaemosti.** [World map of evaporativity.] Leningrad, Gidrometeoizdat, **1957.** 37 p. 3 tables, 16 refs. **DWB** (M73 193mi)—Extensive notes accompanying this world chart of potential evaporation or evaporativity include discussion of theory (physical basis of charts) and practical uses, a description of the chart and notes on the variations in evaporativity in the U.S.S.R., Western Europe, Asia, Australia, Africa, North America and South America. The references cited are all to Russian literature on this subject. A table gives mean latitudinal values for 80°N to 55°S, and another gives extremes of evaporation in 16 zones of 5 continental areas, and for all continental areas of the earth. These range from 30–50 mm/year in the zone of snow and ice of Asia and Arctic Islands (20–100 mm in some zones of North America), to 1700–5300 mm in the tropical deserts of Africa. *Subject Headings:* **1. Evaporativity charts of earth 2. Potential evaporation data.**—*M.R.*

NEW SERIALS

10.4–21 551.481.1(05) 551.46(05)

Limnology and Oceanography, Baltimore, Md., Vol. 1, No. 1, Jan. **1956.** Latest issue seen, Vol. 3, No. 1, Jan. **1958.** Quarterly. Issued by American Society of Limnology and Oceanography. Price: to nonmembers, $10.00 from Society, Woods Hole, Mass. Free to members with annual dues of $7.50. **DLC**—The Limnological Society of America was organized on Jan. 1, 1936 and the American Society of Limnology and Oceanography in 1948. The present journal was started in Jan. 1956 to provide an outlet for publication of scientific papers on all aspects of physical, chemical, geological and biological oceanography and limnology. Papers published in the first three volumes appear to be of a uniformly high caliber, with ample quantitative data (charts, graphs and tables), well documented by extensive reference lists and with good informative author's abstracts. *Subject Headings:* **1. Limnology periodicals 2. Serial publications 3. Oceanography periodicals 4. American Society of Limnology and Oceanography.**—*M.R.*

GENERAL GEOPHYSICS AND METEOROLOGY

GEOPHYSICS

See: **Theoretical geophys. conferences** (Vestine), 10.4–45.

IGY

See also: **Operation Deepfreeze,** 10.4–14; **WMO Executive Comm. meetings** (Ashford), 10.4–28; **Yugoslav aerological service** (Vujičić-Gamser), 10.4–41; **Int. Polar Year, 1882–1883** (Nicolet), 10.4–54.

10.4–22 550.3:061.3(8

El Año Geofísico Internacional. [International Geophysical Year.] *Revista Meteor lógica del Peru*, Lima, 3(6):11–20, **1957.** 6 photos, 6 refs. **DWB**—General objectives of th IGY are reviewed. Peru will participate by means of most modern aerological equipmer installed at 25 stations, including a radiosonde station at Lima. Sampling of upper air fo purposes of radioactivity measurement will be among the many types of observations mad The Huancayo Magnetic and Ionospheric Observatory is among the several institution represented in the National IGY Committee of Peru. *Subject Heading:* **1. Peruvian participa tion in IGY.**—*G.T.*

10.4–23 550.3:061.3(9

International Geophysical Year, 1957/1958. [Belgian Participation], **Année Gé physique Internationale 1957–1958. Programme de la Belgique, du Congo Belge et d l'Expédition Antarctique Belge.** [International Geophysical Year 1957–1958. Program Belgium, Belgian Congo and the Belgian Antarctic Expedition.] [*Académie Royale d Sciences . . . de Belgique. Classe des Sciences, Opera*], No. 1, **1958.** 62 p. **DWB**—Progra established on the basis of the reports received from the different participating Institution The programs of the various scientific branches are clearly related in detail (World Day Meteorology, Geomagnetism, Night Airglow, Ionosphere, Solar Activity, Latitudes an Longitudes, Glaciology, Oceanography, Rockets and Satellites, Seismology, Gravimetr Nuclear Radiation). The general program of Belgium and the Belgian Congo, and th scientific program of the Belgian Antarctic Expedition 1957–58 are also related in detail this publication. *Subject Headings:* **1. IGY Antarctic program 2. Belgian participation IGY.**—*A.V.*

10.4–24 550.3:061.3(98/9

Van Mieghem, Jacques, **De Meteorologische waarnemingen gedurende het Internationa Geophysisch Jaar in de polaire zones.** [The meteorological observations in the Polar regio during the International Geophysical Year.] *Vlaamsche Academie voor Wetenschappen, Le teren en Schoone Kunsten van België, Verslagen en Voorstellen*, No. 7, **1957.** 6 p.—Program the meteorological observations in the Polar regions during the IGY. *Subject Heading:* **1. IG Polar program.**—*A.V.*

10.4–25 550.3:061.3(43

†Olpińska-Warzechowa, K., **Polska bibliografia MGR.** [Polish IGY bibliography *Acta Geophysica Polonica*, Warsaw, 5(4):308–309, **1957.** 26 refs. **DWB, DLC**—A bibl ography of 26 items dealing with Polish publications on the IGY that appeared during 19 and 1957. The papers deal with the IGY programs as a whole and with Polish contributio to the program, such as participation in the Antarctic expeditions to Spitsbergen, China a Vietnam, participation in oceanographic work, etc. *Subject Headings:* **1. Polish participati in IGY 2. IGY publications 3. IGY bibliographies 4. Poland.**—*I.L.D.*

10.4–26 551.501.1:551.593.653:551.506.

†Akademiia Nauk SSSR, **Instruktsiia dlia nabliudenii serebristykh oblakov.** [Instructio for the observation of noctilucent clouds.] Moscow, **1957.** 21 p. 6 photos, forms, 2 tabl

27 refs. Note: p. 13–17 inked out. Laid in: Corrected appendix, No. 1, **Calendar of the beginning and end of observations of noctilucent clouds. DWB**—General instructions concerning noctilucent clouds, morphological classification of noctilucent clouds, characteristics (geographical, seasonal and year-to-year variation), observation techniques (visual, theodolite and photographic), and hours of observation for different latitudes and seasons (usually observed when sun is 6° to 18° below the horizon). Photographs illustrate the various types. *Subject Headings:* **1. Noctilucent cloud observation instructions. I. International Geophysical Year, 1957/58. Soviet Participation.**—*M.R.*

10.4–27 550.3:061.3

Belousov, V. V., **Na soveshchanii geofizikov v IAponii.** [At the meeting of geophysicists in Japan.] *Priroda*, Moscow, 46(12):41–48, Dec. **1957.** photos. **DLC**—In this report on a meeting of geophysicists in Japan, the author devotes only about one page to the Regional Western Pacific Conference on the IGY which took place on Feb. 25–March 2, 1957 in Tokyo. Its purpose was to coordinate and make more precise the programs of investigation carried out during the IGY by the countries contiguous to the Western Pacific. It covered the fields of: meteorology, cosmic rays, determination of latitudes and longitudes, oceanography, seismology, gravimetry, atmospheric radioactivity, atmospheric investigations by means of rockets and satellites. It was attended by delegations of Soviet and American scientists. *Subject Headings:* **1. IGY program 2. IGY geophysics program 3. IGY meteorological program.**—*A.M.P.*

WMO

See also: **Agromet. conf., Hamburg** (Bourke), 10.4–48; **Climatological data presentation** (Schumann), **10.4–105.**

10.4–28 551.5:550.3:061.3

Ashford, O. M., **International Geophysical Year 1957–58: decisions of WMO executive committee.** *World Meteorological Organization, WMO Bulletin*, 5(3):89–92, July **1956. DWB**—Decisions of the executive committee with respect to IGY are discussed. The plans for a WMO data center, as outlined by VAN MIEGHEM, are stressed, and the detailed plans for organizing and financing a microcard exchange program, the trial period (Jan. 6–10, 1957) and cost, Antarctic codes, alert warnings and Special World Intervals, and dissemination of information re IGY by WMO are treated in some detail. *Subject Headings:* **1. WMO. Executive Committee meetings 2. IGY-WMO program 3. IGY data center.**—*M.R.*

10.4–29 551.509.5:551.579:378.4

Ashford, O. M., **Seminar in Belgrade [on] hydrologic forecasting and the water balance.** *World Meteorological Organization, WMO Bulletin*, 7(1):10–14, Jan. **1958.** 3 photos. **DWB**—Seminar held in Belgrade, Oct. 28 to Nov. 16, 1957 was participated in by 40 hydrologists from 18 countries in Europe, S.W. Asia and Africa. A short course of lectures and practical laboratory was included. D. A. DAVIES spoke on growing interest of WMO in hydrology. Hydrological forecasting studies of the water balance (MATHER and THORNTHWAITE), general discussions, excursions to points of interest (hydrologic and meteorological) in and near Belgrade are reported. *Subject Headings:* **1. Hydrologic forecasting seminars 2. Hydrologic cycle conferences 3. Belgrade, Yugoslavia.**—*M.R.*

10.4–30 551.5:061.3(26)

Zakharov, L. A. and Istoshin, Iu. V., **Vtoraia sessiia Komissii morskoĭ meteorologii Vsemirnoĭ meteorologicheskoĭ organizatsii.** [Second session of the Commission on Maritime Meteorology of the World Meteorological Organization.] *Meteorologiia i Gidrologiia*, No. 1:60–61, Jan. **1957. DWB, DLC**—The second session of the Commission on Marine Meteorology of the WMO was held at Hamburg during Oct. 16–30, 1956. The questions discussed and resolutions adopted are summarized. These included an album of illustrations and abbreviations of ice nomenclature; the formulation of an ice code; questions dealing with the measurement of sea surface temperature, observation and reporting of visibility at sea, aero-

logical observations from commercial vessels, increase in the number of vessels and personnel engaged in hydrometeorological observations; preparation of marine climatological atlases etc. *Subject Heading:* **1. WMO. Marine Meteorology Commission.**—*I.L.D.*

ARCTIC RESEARCH

See also: **Climatic analogs, U.S.S.R., Alaska, Canada** (Falkowski), 10.4–10; **Soviet ice floe stations** (Burkhanov), 10.4–16; **Record low temps., So. Pole, Greenland, Siberia** (Zikeev), 10.4–36; **Ice-driftwind relationships, Arctic Ocean** (Drogaĭtsev), 10.4–244.

10.4–31 551.575.1:551.578.4(798

Thuman, William C. and Robinson, Elmer, **Studies of Alaskan ice fog particles.** Stanford Research Institute, Contract AF 19(122)-634, SRI Project CU-473, Scientific Report No. 2, Sept. 30, **1953.** 6 p. 9 figs., 10 refs.—During the 1952–1953 winter, studies were made at Eielson Air Force Base, Alaska, of ice fog and other low-temperature aerosol phenomena. The particulate material, collected by settling onto glass slides at temperatures below −20°C, was classified as hexagonal plates, prismatic columns, and droxtals—a droxtal being an equant solid particle with rudimentary crystal faces. The hexagons and prisms are several times larger than the droxtals and all three tend to be smaller at lower temperatures. The droxtals increase in relative number with decreasing temperatures, and the high incidence of restricted visibility at low temperatures is attributed to the presence of the droxtals rather than the crystals. Illustrations show microphotographs of 6 types of crystals collected and analyzed in this project. *Subject Headings:* **1. Ice fog 2. Droxtals 3. Alaska.**—*Authors' abstract.*

10.4–32 551.509.323:551.524.36(98

*Lackey, Earl E. (*Geographer, Environmental Analysis Branch*), **A method for assessing and mapping the January daily minimum temperatures of northern North America.** *U. S. Quartermaster Research and Engineering Center. Environmental Protection Research Div. Technical Report,* EP-88, May **1958.** 32 p., 11 figs., 10 tables, 5 refs. **DWB** (M86 U585t)—This report presents a method of assessing and mapping the January daily minimum temperature for northern North America (Canada north of 55°N lat., Alaska, Greenland, and Iceland). The method of assessing the frequency of daily minima requires only: (a) the mean daily minimum, (b) the absolute minimum, and (c) the length of the record. By use of these data and an adjusted probability scale, the frequency or percentage distribution of daily minimum temperatures for a station may quickly be ascertained. The adjusted probability scale was used in estimating the daily minimum probabilities for 71 stations in northern North America. Five maps constructed from the tabulated data show how the table may be used to give an overview of the whole Arctic area, featuring any selected temperature frequency. The Appendix explains how the mean monthly temperature may be used to achieve the same results. However, the results are not quite as accurate. *Subject Headings:* **1. Minimum temperature frequencies 2. Arctic.**—*Author's abstract.*

10.4–33 551.586:64(

Dusek, E. Ralph, **Encumbrance of Arctic clothing.** *U. S. Quartermaster Research and Engineering Center. Environmental Protection Research Div., Technical Report,* EP-85, April **1958.** 35 p. 15 figs., 16 tables. **DWB** (M86 U585t)—The degree to which Arctic clothing restricts body movements was investigated in this study. Fifteen tests of performance were used; twelve of these tests were found to be sensitive to the restrictions imposed on the individual by clothing. Arctic clothing was found to be particularly restrictive on movements of the neck, shoulder, arm, waist, and crotch. The results provide the clothing designer as well as the designer of Army equipment, with information on the movement limits of the individual when wearing heavy Arctic clothing as well as when lightly clothed. These tests are useful to obtain specific information regarding the movements of body parts and to obtain evaluations of proposed design changes in clothing and equipment. *Subject Headings:* **1. Clothing efficiency 2. Clothing encumbrance 3. Arctic clothing.**—*Author's abstract.*

10.4–34 551.578.46(988)

Benson, C. S. and Ragle, R. H., **Measurements by SIPRE in 1955 on the accumulation markers of Expéditions Polaires Françaises in Central Greenland.** *U. S. Snow, Ice and Permafrost Research Establishment, Special Report*, No. 19, July **1956.** 5 p. 5 figs. (incl. photos), 3 tables. **DWB, DLC**—Annual accumulation of snow averaged from 1.02 to 1.27 m for the period 1951–55 and 0.90 to 1.37 m in 1950/51. The accumulation shows some decrease towards the interior. The measurements, at an altitude of 2450–2800 m, were made during an expedition, reaching from Thule to station Centrale and then towards the west coast. *Subject Headings:* **1. Snow accumulation 2. Project Jello 3. Greenland.**—*A.A.*

10.4–35 551.578.4(988)

U. S. 1st Engineer Arctic Task Force, Fort Belvoir, Va., **After Operations Report [of] Engineer Research and Development Program, Greenland 1955. 1957?** 148 p. 31 figs., 10 plates.—Detailed temperature and snow physics studies made at several camps on Greenland during 1955 are reported and supported by graphs, tables, and illustrations. The studies of snow compaction were for the purpose of establishing landing fields or runways on snow and ice. Snow drift and frozen ground, Arctic whiteout, snow temperature and water content studies were made and reported. Maximum and minimum temperatures for each 24 hrs are shown graphically for Camp Tuto, Camp Red Rock, Blue Ice Valley and Camp Whitehorse for June–Oct. 1955. *Subject Headings:* **1. Snow physics studies 2. Snow temperatures 3. Camp Tuto, Greenland.**—*M.R.*

ANTARCTIC RESEARCH

See also: **Operation Deepfreeze, 10.4–14.**

10.4–36 551.524.36(98/99)

*†Zikeev, Nina A. (Stepanova) (*Office of Climatology, U. S. W. B., Wash., D. C.*), **On the lowest temperatures on earth.** *Monthly Weather Review*, Wash., D. C., 86(1):6–10, Jan. **1958.** 1g., 3 tables, 33 refs. Also: Quiroz, Roderick (*U. S. Air Weather Service Climatic Center, Wash., D. C.*), **Lowest temperature in Greenland.** *Monthly Weather Review, Wash., D. C.*, 86(3):99, March **1958.** 2 refs. **DWB, DLC**—A well-documented article in which the record low temperatures at the South Pole (−102.1°F or −74.5°C) on Sept. 17, 1957 are critically compared with previously established world's records in Siberia since Jan. 21, 1838 at Yakutsk (−76°F or −60°C); with record low temps. of Polar expeditions, the long unbroken record of −67.6° (89.7°F) at Verkhoyansk on Feb. 5 and 7, 1892, and the slightly lower record for Oimekon, Siberia (700 m elevation) −67.7°C (−89.9°F) on Feb. 6, 1933. Oimekon has all the characteristics needed for a "cold pole" as it is on a high plateau protected from cyclonic winds. Extreme minima in Greenland are −64.8°C (−84.6°F) March 20, 1931 at Eismitte and Feb. 22, 1950 at the French station. Quiroz notes a temperature on Greenland at the British Station "Northice" (78°04′N, 38°29′W, elevation 2345 m) of −86.8°F on Jan. 9, 1954 which is below the record given in the first article of −64.8°C or −84.6°F for the icecap. Temperatures of < −75°F were recorded 16 times in 20 months (November 1952–June 1954) at Northice indicating a possibility of temperatures even lower in a long period of time. *Subject Headings:* **1. Record low temperatures 2. South Pole temperature extremes 3. Verkhoyansk, Siberia 4. Oimekon, Siberia 5. Northice, Greenland.**—*M.R.*

10.4–37 551.524.36:551.581(99)

*Flowers, E. C. and McCormick, R. A. (*both, U. S. W. B.*), **World record low temperature, South Pole, September 17, 1957.** *Monthly Weather Review*, Wash., D. C., 85(11):383, Nov. **1957.** 2 tables. **DWB**—Detail of the record 2 m, minimum of 102.1°F set at the Amundsen-Scott IGY station at the S. Pole at 2137 GMT on Sept. 17, 1957 (previous low was −100.4°F on May 11, 1957). The low temp. came at the height of the coldest prolonged cold snap in the coldest month at the S. Pole station. From May 11 to Sept. 17 the minimum went below −95°F on 17 occasions, and was < −90°F for 93 consecutive hrs. This was at the end of "winter" when the sun showed as a mirage a week before official "sunrise" (Sept. 23, 1957). Table gives 2 m, 5 m and 10 m temp. and wind data for the period, and another table gives the

mean, maximum and minimum temp. for each month of 1957 (maximum −25.6°F, mea
−73°F). *Subject Headings:* **1. Record low temperatures 2. South Pole temperature e
tremes 3. South Pole (Amundsen-Scott) Station.**—*M.R.*

10.4–38 551.524.36(9

Caskey, James E., Jr. and Flowers, E. J., **World record low temperature, South Pol
September 18 [i.e., Sept. 17], 1957.** *Monthly Weather Review*, Wash., D. C., 85(9):32
Sept. **1957.** table. **DWB**—Temperature of −102.1°F was observed at 2 m on Sept. 18, 195
at 2137 GMT at Amundsen-Scott IGY Station (at South Pole). Previous record was −100.4°
on May 11, 1957. Temperature at surface was −103.3°F; at 5 m, −101.0°F and at 10 m
−79.5°F. *Subject Headings:* **1. Record low temperatures 2. South Pole temperature e
tremes 3. South Pole (Amundsen-Scott) Station.**—*M.R.*

10.4–39 551.506.1(9

*Australia. Bureau of Meteorology, **Meteorology [of] Mawson, Heard and Macquar
Islands, 1954.** *Australian National Antarctic Research Expeditions, A.N.A.R.E. Report
Series D*, Vol. 7, June **1957.** 220 p. Almost entirely tables. **DLC, DWB**—Machine tabula
tions of pressure, temp., humidity, wind, precip., radiosonde and upper air wind observatio
for Heard and Macquarie Islands and Mawson during 1954, including cumulative or frequenc
analyses, as well as straight listings of 3-hourly (or other) field observations. Names
personnel, coordinates, details of instruments and observational methods, codes used, an
climatological (monthly and one year) summaries of the important elements are given. *Subje
Headings:* **1. Annual meteorological data summaries 2. Observational data 3. Mawso
Antarctica 4. Heard Island 5. Macquarie Islands.**—*M.R.*

SERVICES, INSTITUTIONS, AND OBSERVATORIES

See also: **Met. services, E. Europe** (Zigun), 10.4–46; **Agromet. services** (Ulanova), 10.4–89.

10.4–40 551.507.35:061.

Murgatroyd, R. J. (*Meteorological Office, U.K.*), **The Research Flight of the Britis
Meteorological Office.** (In: Angola. Servico Meteorológico, **Miscelanea geofísica.** Luanda
1956. p. 333–343. 5 figs., 20 refs. **DWB** (M(08) A592mi)—As part of the expansion of th
research organization of the Meteorological Office at the end of the Second World War, th
Meteorological Research Flight was formed at Farnborough as a permanent agency for a
types of meteorological research. It is the purpose of this article to outline what has bee
accomplished during the last ten years and describe the way in which the Meteorologica
Research Flight is now used. The scope of its work now includes measurements at hig
altitude in the stratosphere, sampling of a variety of aerosols, cloud physics, radiation measur
ments, cooperation in synoptic studies, and rain-making experiments. A list of reports o
various aspects of this work is appended. *Subject Headings:* **1. Meteorological Researc
Flight 2. British Meteorological Office.**—*From author's introduction.*

10.4–41 551.5:061.3 551.506.7(497.1

Vujičić-Gamser, K., **Razvoj aerološke službe.** [Development of the Aerological Service.
Yugoslavia. Hidrometeorološka Služba, Vesnik, 6(1/2):34–40, **1957.** **DWB**—The first upper
air observations in Yugoslavia were made more than half a century ago at Bjelašnica Mountai
Observatory; during World War I; pilot balloon measurements were made by both the Austro
Hungarian and French forces. Routine pilot balloon observations were started in 1924 at
stations and by 1941 the number of stations was 20. At present 33 daily pilot balloon ascent
are being made at 14 stations and radiosonde ascents at 3 stations. Activities of the Aerologica
Service comprise: (1) Aerological measurements (pilot balloon, nephoscope and radiosonde)
(2) Observation of general weather development and of unusual phenomena, and cloud pho
tography; (3) Collection and checking of observations and control of measurement at th
stations; (4) Data analysis and publication and (5) Participation in the WMO Aerologica

Commission and in IGY. Each of these activities is discussed and future plans are outlined. *Subject Headings:* **1. Yugoslav aerological service 2. Yugoslav participation in IGY 3. Yugoslavia.**—*G.T.*

10.4–42 551.579:06

Zolutkhin, A. A., **Direktivy XX s'ezda KPSS po shestomu piatiletnemu planu i zadachi gidrometsluzhby.** [Directives of the 20th meeting of the Communist Party of the Soviet Union for the 6th five-year plan and the tasks of the Hydrometeorological Service.] *Meteorologiia i Gidrologiia*, No. 9, 3–11, Sept., **1956. DWB, DLC**—The role incumbent upon the Hydrometeorological Service in the economic development of the U.S.S.R. during the sixth 5-year plan period is spelled out. The special services that hydrometeorology is to give to agriculture; aviation, both civil and military; the hydroelectric industry; the study and development of the water resources of the U.S.S.R.; marine hydrology; transportation and communication etc. are outlined. Also the needed research in hydrometeorology is discussed. *Subject Headings:* **1. Soviet hydrometeorological service 2. U.S.S.R.**—*I.L.D.*

10.4–43 551.5:629.12:06

Brodskiĭ, A. V., **25-letie Tsentral'noĭ aviameteorologicheskoĭ stantsiĭ.** [25th anniversary of the Central Aviation-Meteorological Station], *Meteorologiia i Gidrologiia*, No. 11:56–57, Nov. **1956. DWB, DLC.** Trans. into English available for reference. **DWB** (M:629.13 B8643th)—In 1930 a group of meteorologists was established in the M. V. Frunze Airport in order to provide weather information for civilian aviation. This was the nucleus around which developed the Office of Weather Information of the Central Weather Bureau. The development of Soviet civil aviation is described briefly. The scientific and practical activities of the station since its establishment are summarized. These included participation by individual members in the "Cheliuskin" expedition in 1933, studies on the physical meteorological conditions of airplanes, flight conditions in frontal zones, and providing continuous weather information to airplanes in flight, etc. *Subject Headings:* **1. Soviet aeronautical meteorology service 2. U.S.S.R.**—*I.L.D.*

CONFERENCES AND SYMPOSIA

See also: **Hydrologic forecasting seminars, Yugoslavia** (Ashford), 10.4–29; **Med. met. conf.** (Knepple), 10.4–100; **WMO Radiation Comm., Switz.** (Mörikofer), 10.4–211.

10.4–44 551.5(08)

Polar Atmosphere Symposium, Oslo, July 2–8, 1956, **Proceedings, Pt. 1, Meteorology Section.** Ed. by R. C. Sutcliffe. Published for and on behalf of the Advisory Group for Aeronautical Research and Development, North Atlantic Treaty Organization, by Pergamon Press, New York, **1958.** 341 p. figs. (incl. photos), tables, refs., eqs. (*AGARDograph*, No. 20, Pt. 1). Price: $12.00. Also issued as *Journal of Atmospheric and Terrestrial Physics*, London, Special Supplement, 1957, issued **1958** (with same paging, etc.). (For listing of contents, *see* Pt. III, p. 1172, Sept. 1958, *MAB*. These papers abstracted separately.) **DWB, DLC**—Twenty three papers representing the meteorological part of the Polar Atmosphere Symposium (one in summary form), constitute this volume, along with discussions and the opening speeches by F. L. Wattendorf and H. U. Sverdrup. Papers cover problems of climatology, synoptic meteorology, aerology, forecasting, radiation, ozone, inversions, sea ice, etc. The papers dealing with the polar ionosphere were published in **Proceedings, Pt. 2, Ionospheric Section,** a separate volume. (For abstract on **Pt. 2, Ionospheric Section,** *see* 9.11–1, Nov. 1958, *MAB*. For listing of contents of Pt. 2, *see* Pt. III, p. 639, May 1958, *MAB*. These papers also abstracted separately.) *Subject Headings:* **1. Polar atmosphere symposium 2. Polar meteorology 3. Oslo, Norway. I. Wattendorf, F. L. II. Sverdrup, H. U.**—*G.T.*

10.4–45 550.3:06

Vestine, E. H. (*Dept. of Terrestrial Magnetism, Carnegie Inst. of Wash.*), **Theoretical geophysics.** *Science*, Wash., D. C., 124(3214):234–236, August 3, **1956. DLC**—Transactions

of a Conference on Theoretical Geophysics held in Washington, D. C., Feb. 1–3, 1956, sponsored by the National Science Foundation and Carnegie Institution of Wash., and steered by JOHN VON NEUMANN, E. H. VESTINE, L. V. BERKNER, J. KAPLAN and others, with J. CHARNEY as secretary and 100 participants, are summarized. Subjects include theoretical and mathematical studies of meteorology, oceanography, hydromagnetism, geomagnetism, aurora, cosmic rays, ionospheric physics, atmospheric electricity, geochemistry, seismology, gravity and geodesy, technophysics and origin of earth. Among discussions are mentioned those by H. STOMMEL, D. FULTZ, VICTOR STARR, W. M. ELSASSER, CHANDRASEKHAR, GALLET, CHAPMAN, BENNETT, GUNN, BYERS, EWING, LANDSBERG and others. *Subject Headings:* **1. Theoretical geophysics 2. Geophysics conferences.**—*M.R.*

10.4–46 551.5:061 551.579:061.3

Zigun, V. P., **Mezhdunarodnoe soveshchanie po voprosam gidrometeorologii.** [International meeting on problems of hydrometeorology.] *Meteorologiia i Gidrologiia, Leningrad,* No. 6:66–67, Nov./Dec. **1955. DWB, DLC**—This international meeting, which was held in Moscow during Sept., 1955, consisted of the European countries behind the "iron curtain." Its main interest was the improvement in the exchange of hydrometeorological and aerological observations. Measures were adopted to exchange 24-hr observations, to unify the observation periods, increase aerological observation, to exchange hydrometeorological and aerological observation by telegraph, to improve the hydrometeorological flotilla on the Black Sea and Baltic Sea, to adopt code FM-15 for exchanging aviation and aerological data, and codes FM-51 and FM-52 for synoptic data among airports, etc. *Subject Headings:* **1. Meteorological services, Eastern Europe 2. Hydrometeorology conferences.**—*I.L.D.*

10.4–47 551.579.4 627.51

Aizenberg, M. M., **Konferentsiia po voprosam izucheniia selevykh potokov i mer borby s nimi.** [Conference on the problem of studying flash floods and means of preventing them.] *Meteorologiia i Gidrologiia,* Leningrad, No. 1:66, **1958. DWB, DLC**—A report of a conference organized by the Council for Studying the Productivity of the Ukrainian S.S.R. and the Institute of Mineral Resources of the Academy of Sciences of the Ukrainian S.S.R. to study flash floods and their control in the Crimea. It was pointed out that considerable experience in the control of flash floods has been obtained by the Central Asiatic Scientific Forecasting Institute. The Conference proposed to organize interdisciplinary studies on the formation of flash floods in relation to attendant hydrological and meteorological conditions, to undertake hydrographic studies on basins subject to flash floods by expanding the rain gage network and utilizing radar, etc. *Subject Headings:* **1. Flash floods 2. Flood control 3. Crimea.** —*I.L.D.*

10.4–48 551.5:63:061.3

Bourke, P. M. Austin, **Meteorology and crop protection.** *World Meteorological Organization, WMO Bulletin,* 7(1):14–17, Jan. **1958.** fig. **DWB**—A summary of the problems facing the modern agricultural meteorologist and of the history of agrometeorological work of various disciplines (chemistry, plant pathology, entomology, etc.) as brought out at the Fourth International Congress of Plant Protection (Hamburg, Sept. 8–15, 1957) attended by 1500 participants from 75 nations. The author represented WMO and the Commission for Agricultural Meteorology. Over 400 papers were read and discussed, including several on agrometeorology as summarized. An upper air (500 mb) chart shows origin and trajectory of spores in a black rust outbreak in S.W. England, which affected wheat crop. Surface winds did not show the true trajectory (which came from N. Africa). *Subject Headings:* **1. Agrometeorological conferences 2. Crop protection 3. Hamburg, Germany.**—*M.R.*

10.4–49 551.586(08)

Buettner, Konrad J. K. (*Dept. of Meteorology and of Physiology, Univ. of Wash., Seattle*), **Aim and purpose of Symposium on Bioclimatology.** *Federation of American Societies for Experimental Biology, Federation Proceedings,* 16(2):607–608, July **1957. DLC** (QH301.F37)—Bioclimatic research is divided into three phases of approach: (a) quantitative bioclimatology

or physical bioclimatology; (b) qualitative bioclimatology which describes observed phenomenon either caused or elicited by atmospheric agents and (c) statistical bioclimatology, which attempts to correlate any number of weather elements or weather combinations with human behavior, responses and health. Healthful climates and climatotherapy are discussed. *Subject Heading:* **1. Bioclimatology symposia.**—*I.L.D.*

10.4–50 551.585:061.3

Nosek, Milŏs, **Zpráva o pracovní poradě komise pro vymezení klimatických oblastí v ČSR.** [Working conference of the Committee on the Determination of Climatic Regions in Czechoslovakia.] *Meteorologické Zprávy*, Prague, 10(3):82–83, **1957.** photo. **DWB**—Account of a meeting at which general problems of climatic classification and specific problems concerning Czechoslovakia were discussed and a map of climatic regions of Czechoslovakia was submitted. Guests from the U.S.S.R., Hungary and Poland participated. *Subject Headings:* **1. Climatic regions 2. Climatic classifications 3. Conferences 4. Czechoslovakia.**—*G.T.*

EDUCATION, HISTORY AND BIOGRAPHY

EDUCATION

See also: **Met. Res. Flight, Brit. Met. Off.** (Murgatroyd), 10.4–40.

10.4–51 551.5(09)

Vassy, E., **Cours inaugural de la chaire de physique de l'atmosphère.** [Inaugural lecture from the Chair of Physics of the Atmosphere, Sorbonne, Nov. 15, 1957.] *La Météorologie*, Paris, Ser. 4, No. 48:537–544, Oct./Dec. **1957. DWB**—The author outlines the program of his course for the newly established Chair of Atmospheric Physics at the Sorbonne. He states that he plans to place the emphasis on direct application of physical knowledge to atmospheric phenomena (structure, emission phenomena, refraction and condensation phenomena). The development of meteorology during the last decade into a prominent science, and the most important discoveries which marked that progress are outlined. *Subject Headings:* **1. Progress in meteorology 2. Atmospheric phenomena.**—*G.T.*

10.4–52 5.001.5

Battelle Memorial Institute, Columbus, Ohio, **Research by cooperative organizaticns: a survey of scientific research by trade associations, professional and technical societies, and other cooperative groups, 1953.** *U. S. National Science Foundation, NSF*, No. 56–12, pub. **1956.** 47 p. 16 tables, 4 charts, forms. **DWB** (607 B335r)—A survey of research and development activities in America since 1895. The efforts of trade associations, scientific and engineering societies, etc. are evaluated quantitatively and comparatively. The Hawaiian Sugar Planters Association was the first trade association to have a full scale research program (1895). The American Geographical Society began research in 1851. *Subject Headings:* **1. Scientific research and development 2. Scientific societies.**—*M.R.*

10.4–53 551.5:061.6:378

National Academy of Sciences. Committee on Meteorology, **Research and education in meteorology: an interim report of the Committee.** Lloyd V. Berkner, chairman. Wash., D. C., Jan. 25, **1958.** 27 p. 5 tables. Mimeo. **DWB.** Also issued in: *Weatherwise*, Boston, 11(2):60–65, April **1958,** and in *American Meteorological Society, Bulletin*, 39(6):293–314, June **1958.**—A comprehensive analysis of the present status or research, personnel, salaries, employment, educational achievement and opportunity, etc. in meteorology as compared with other sciences (physics, geology, astronomy, mathematics, biology, chemistry) is presented. A number of recommendations for greatly expanding the research efforts in several specified fields, and in general, are presented. Tables give recent data on ages, education, employment, etc. of meteorologists and other professions. Activities of universities, government, society (A.M.S.), and high school are reviewed. *Subject Headings:* **1. Meteorological research 2. Meteorological man power 3. Meteorological education.**—*M.R.*

HISTORY

See also: **Aviation met. services, U.S.S.R.** (Brodskiĭ,) 10.4–43; **Severe winters, England** (Manley), 10.4–215; **Progress of Soviet aerology** (Golyshev), 10.4–296.

10.4–54 551.506.5(09)(98/99)

Nicolet, Marcel, **Genèse de la première Année Polaire Internationale, 1882–1883.** [Origin of the first International Polar Year, 1882–1883.] *Ciel et Terre*, Brussels, 72(3/4):101–110, March/April **1956. DWB**—The part K. WEYPRECHT played in initiating the first International Polar Year which took place after his death on 21st of March, 1881, is reviewed at some length with quotations from the transactions of the three International Polar Conferences (1879, 1880 and 1881) and the International Meteorological Congress, Rome (October 1879). The objectives of the enterprise as outlined by WEYPRECHT in 1877 are listed and the problem of whether to have many stations for a short period or a few permanent stations with limited objectives (as proposed by BUYS BALLOT) is discussed. *Subject Headings:* **1. International Polar Year, 1882–1883 2. History of Polar Year. I. Weyprecht, Karl.**—*M.R.*

10.4–55 551.46(09)

Muromtsev, A. M., **Okeanograficheskaia izuchennost' Tikhogo okeana.** [State of knowledge on the oceanography of the Pacific Ocean.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:21–25, May **1957.** 2 figs. **DWB**—A brief history is given of scientific oceanographic observations in the Pacific Ocean, which, according to the author, began in 1804 with the expedition of I. F. KRUZENSHTERN and IU. F. LISIANSKIĬ in the "Nadezhda" and "Neva." The extensive observations on the distribution of the hydrological elements and their seasonal variations for various depths are deposited in the State Oceanographic Institute. The distribution of available deep water observations for the Pacific Ocean are shown on a map. The necessary observations for the Pacific Ocean are discussed. *Subject Headings:* **1. History of oceanographic observations 2. Oceanographic research 3. Pacific Ocean.**—*I.L.D.*

10.4–56 551.48(09)

Costescu, P. H., **Contribuţiuni la cunoaşterea evoluţiei retelei hidrografice din bazinul riului Argeş datorită intervenţiei omului.** [Development of the hydrographic network of the Arges River due to human activities.] *Meteorologia şi Hidrologia*, Bucharest, 1(1):54–63, Oct. **1956.** 2 figs., 10 refs. **DWB**—Historic documents are quoted showing details of the building of canals, regulation of rivers and water use practices in the Arges basin during the past 200 yrs. *Subject Headings:* **1. History of hydrography 2. Hydrographic networks 3. Arges River, Romania.**—*G.T.*

10.4–57 551.5:92 551.509.2(09)

Affronti, Filippo, **Cento anni della legge di Buys-Ballot (1857–1957).** [100 years of the Buys-Ballot law (1857–1957).] *Rivista di Meteorologia Aeronautica*, Rome, 18(1):40–43, Jan./March **1958.** 2 figs. Italian, French, English and German summaries p. 40. Also: Cannegieter, H. G., **Honderd jaar wet van Buys-Ballot.** *Hemel en Dampkring*, 56(3):42–45, March **1958. DLC**—A tribute to CHRISTOPHER HENDRICH DIRK BUYS-BALLOT (born in 1817 in Kloetingen, Holland, and died in 1890) and a history of the development from 1852–1860 of his famous law for relationship between pressure and wind. The law was first suggested in 3 publications, dated 1857, and was published in its final form in 1860 in a memoir **Eenige regelen voor aanstaande weersveranderingen in Nederland** (Utrecht, 1860). Six of the first synoptic charts prepared by BUYS-BALLOT for Jan.–March 1852 are reproduced from *Annalen der Physik, Ergängzungsband*, IV, **1854.** *Subject Headings:* **1. Buys-Ballot law 2. History of synoptic meteorology 3. Buys-Ballot, C. H. D.**—*M.R.*

10.4–58 551.501.9:551.5:06(09)

Bilancini, Raoul, **Echi lontani della meteorologia italiana.** [Distant echoes of Italian meteorology.] *Rivista di Meteorologia Aeronautica*, Rome, 18(1):80, Jan./March **1958. DLC**—Note on the "Florentine network" of meteorological stations in Italy and abroad, established under the GRAND DUKE FERDINAND II of Tuscany in 1654 and under the direction

of his secretary, LUIGI ANTINORI. Instruments were distributed by the GRAND DUKE and observations made simultaneously by cooperative observers. In an article by ANANIASZ ROJECKI in *Przegląd Geofizyczny*, No. 3/4, **1956**, the Florentine network was mentioned as the first systematic network, and as a station measuring pressure in 1647 (3 yrs after construction of the first barometer in 1643) by TORRICELLI and VIVIANI. *Subject Headings:* **1. History of meteorological networks 2. Florentine network. I. Antinori, Luigi II. Ferdinand II of Tuscany.**—*M.R.*

BIOGRAPHY

See also: **100 years of the Buys-Ballot law** (Affronti), 10.4–57; **Protzerov and agromet. services** (Ulanova), 10.4–89.

10.4–59 551.5:92

Zum 60. Geburtstag von Professor Dr. Ratje Mügge, [60th birthday anniversary of Dr. Ratje Mügge]. *Frankfurt a.M. Universität. Meteorologisch-Geophysikalisches Institut, Berichte*, No. 6:11–12, **1956. DWB?** —PROFESSOR RATJE MÜGGE's scientific activities are summarized. After working in applied geophysics, MÜGGE joined the Flight Weather Service at Frankfurt a.M., which was connected with the Meteorological Institute of the Frankfurt University. Subsequently, he joined the university where he collaborated with STÜNE on dynamic synoptic problems and with F. MÖLLER on long wave radiation. In 1938 he became director of the Institute of Aviation Meteorology at the Technische Hochschule Darmstadt. At present MÜGGE is director of the Frankfurt Meteorological Institute. *Subject Headings:* **1. Biography of Ratje Mügge 2. Mügge, Ratje.**—*I.L.D.*

10.4–60 551.46:92

†Mamaev, O. I., **N. N. Miklukho-Maklaĭ kak okeanograf.** [N. N. Miklukho-Maklaĭ as an oceanographer.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia*, 89(3):255–259, May/June **1957.** 13 refs. **DLC**—MIKLUKHO-MAKLAĬ showed considerable interest in oceanography. Beginning with an interest in biological oceanography (interest in the sponges of the Red Sea, etc.), he subsequently made numerous oceanographic observations during his expeditions in the Pacific Ocean. The various oceanographic observations made of water temperature in the Pacific, near the western coasts of South America, near New Guinea, etc., are described. His oceanographic writings are cited. *Subject Headings:* **1. Miklukho-Maklaĭ, N. N. 2. Biography.**—*I.L.D.*

10.4–61 551.5:92

Sirén, A., **Henrik Renqvist, in memoriam.** *Geophysica*, Helsinki, 4(3):113–115, **1957.** port. **DLC**—RENQVIST, former director of the Finnish Hydrographic Bureau and an outstanding geophysicist, died Feb. 23, 1953. His activities in the fields of geodesy, oceanography, hydrology, and meteorology are briefly outlined. His published works, numbering in the hundreds, were devoted to the various scientific fields in which he was interested. His contributions to seismological investigations were of exceptional importance for the development of that science in Finland. H. RENQVIST was also an active member of various scientific societies and participated prominently, thanks to his knowledge of foreign languages, in many international conferences. *Subject Headings:* **1. Obituary of Henrik Renqvist 2. Renqvist, Henrik.** —*A.M.P.*

10.4–62 551.5:92:016

†Gassmann, F., **[Obituary of] Ernst Wanner, 1900–1955.** pub. **1956(?).** 5 p. port. Bibliography of his publications p. 3–5.—Besides a biographical sketch and a large photograph of E. WANNER, a list of 56 of his works (1926–55) is included. His work was mainly along lines of seismology and geomagnetism, but it also included statistical applications to climatology, precipitation, cyclones, hail, etc. He was born in Bern, worked from 1928–55 for the Swiss Meteorological Service in Zurich where he headed the Earthquake Service, and was later Vice Director. *Subject Headings:* **1. Biography of Ernst Wanner 2. Bibliography of Ernst Wanner 3. Wanner, Ernst.**—*M.R.*

10.4–63 551.5:92

[Obituary notes on] **Snowden D. Flora and Charles Edward Depperman.** *American Meteorological Society, Bulletin*, 38(8):484–485, Oct. **1957. DWB**—S. D. FLORA, former state climatologist for Kansas, died Aug. 28, 1957 at his home in Topeka, Kan. at 78. A few of his works are mentioned. FATHER DEPPERMAN, director of the Manila Observatory for the past decade, died in Manila May 8, 1957. He was born in New York City in 1889 and received his Ph.D. at Johns Hopkins Univ. in 1925 and studied at Oslo and Bergen in 1932. His work included astronomical and seismological studies as well as those on meteorology, especially hurricanes and tropical meteorology. *Subject Headings:* **1. Obituaries 2. Flora, Snowden D. 3. Depperman, Charles E.**—*M.R.*

BIBLIOGRAPHY AND TERMINOLOGY

See also: **Polish participation in IGY** (Ołpińska-Warzechowa), 10.4–25; **Space ency. and glossary,** 10.4–73.

10.4–64 551.582(43):016

Zikeev, Nina (Stepanova) and Spano, Angelo F. (*comps.*), **Supplementary bibliography on the climate of Germany, 1950–1957 (only sources not included in Air Weather Service files and Meteorological Abstracts and Bibliography).** Wash., D. C., Feb. **1958.** 18 p. 53 titles. Mimeo. **DWB** (M(016) U587su)—An alphabetically (by author) arranged bibliography of articles on the climate of Germany from recent periodical literature. Most of the items are in **Meteorological Abstracts and Bibliography.** No indexes provided. Of the first 25 titles of this annotated bibliography, an analysis reveals: 5 were probably too ephemeral to abstract and run in **MAB,** 1 had been abstracted, but not run to date; 8 were run in issues available to the compilers (from Vol. 1, No. 1 through Vol. 8, No. 5), 11 were run in *MAB* from Vol. 8, No. 6 through Vol. 9, No. 11). *Subject Headings:* **1. Bibliography on climate of Germany 2. Climate of Germany 3. Germany.**—*M.R. & D.G.*

10.4–65 551.515:551.461.2:061

†International Union of Geodesy and Geophysics. Association of Physical Oceanography, **Bibliography on generation of currents and changes of surface-level in oceans, seas and lakes by wind and atmospheric pressure, 1726–1955.** Its *Publication Scientifique*, No. 18, **1957.** 83 p. Price: 8 sh. Arranged chronologically by imprint, with alphabetical author index. **DLC**—About 850 references to literature on storm surges, relations between wind, gales, hurricanes, storms, or pressure and currents or sea level. Effect on coasts, estuaries, bays, and lakes are considered. Entries are listed chronologically from 1726–1955 (alphabetically by author within each year). German, French, Spanish, Italian and Dutch titles are in original (not translated). *Subject Headings:* **1. Storm surge bibliographies 2. Wind-ocean current bibliographies.**—*M.R.*

10.4–66 551.579:551.437:016

†Gleason, Clark H., **Watershed management—an annotated bibliography of erosion, streamflow, and water yield publications by the California Forest and Range Experiment Station.** *U. S. Forest Service. California Forest and Range Experiment Station, Technical Paper*, No. 23, Jan. **1958.** 79 p. 204 items. **DWB** (634.9 U583T)—Articles on watershed management in California by California Forest and Range Experiment Stations personnel (1926–1957), regardless of where published, are listed alphabetically by author and then chronologically under each author and are annotated. An author and subject index is included. Subjects include climate, floods and flood control, instruments, plant relations, animal relations, soil relations, water relations, research. A map shows places in California where watershed management studies have been made. Several photographs illustrate experimental plots, etc. *Subject Headings:* **1. Hydrometeorology research bibliographies 2. Watershed management bibliographies 3. Flood control 4. California.**—*M.R.*

10.4–67 551.5:038:494.3

Arifkhanova, M., **O russko-uzbekskom slovare meteorologicheskikh terminov.** [Russian-Uzbek dictionary of meteorological terms.] (In: Akademiia Nauk Uzbekskoĭ SSR.

Institut Matematiki i Mekhaniki, **Meteorologiia i gidrologiia v Uzbekistane.** Tashkent, **1955.** p. 89–91.) **DLC**—In connection with the general program of establishing scientific glossaries and terms for the Uzbek language, the author compiled a geophysical glossary containing 1500 terms. The general characteristics of the meteorological terms are described. All the terms are divided into four groups: I) words and terms present in the Uzbek language with equivalents in Russian; II) terms easily translatable with the aid of existing dictionaries but not containing direct equivalents; III) terms newly introduced into the Uzbek language and containing their original spelling; and IV) newly introduced terms which changed their form according to the rules of Uzbek grammar. The terms in the dictionary are briefly explained and provided with suitable equivalents. *Subject Headings:* **1. Meteorological glossaries 2. Uzbek language 3. Uzbek-Russian glossaries.**—*I.L.D.*

PRACTICAL AND APPLIED METEOROLOGY

MARINE METEOROLOGY AND OCEANOGRAPHY

See also: **Limnology & Oceanog. journals,** 10.4–21; **WMO Marine Met. Comm.** (Zakharov, Istoshin), 10.4–30; **Hist. of oceanog. res., Pacific** (Muromtsev), 10.4–55; **Biog. of Miklukho-Maklaĭ, N. N.** (Mamaev), 10.4–60; **Obit. of Renqvist, H.** (Sirén), 10.4–61; **Storm surge bibliogs.** (I.U.G.G.), 10.4–65; **Windspeed estimation at sea** (Brooks, C. & E.), 10.4–104; **Storm surges, Japan** (Miyazaki), 10.4–186; **Hurricane tides & waves, 1955** (Pore), 10.4–196; **Sea water thermal energy** (Beau), 10.4–205; **Hurricanes and sea-atmos. relationships** (Fisher), 10.4–218; **Wind charts, N. Pacific** (McGary, Naito), 10.4–233; **Ice drift-wind relationships, Arctic Ocean** (Drogaĭtsev), 10.4–244; **Earthquake effects on atmospheric electricity** (Cherniavskiĭ), 10.4–309.

10.4–68 551.46(267) 551.582.3(267)

*Netherlands. Meteorologisch Instituut, **Indische Oceaan Oceanografische en Meteorologische Gegevens.** [Indian Ocean oceanographic and meteorological data.] 2d ed. Its *Uitgave* (Publication), No. 135, pub. **1952.** [Vol. 1], Text. 31 p. charts, tables. [Vol. 2], charts. 24 oversize charts. "Replaces the former edition, **Publication,** No. 104, entitled **Oceanografische en Meteorologische Waarnemingen in den Indischen Oceaan."** (*See* 5B–41, Feb. 1954, *MAB.*) **DWB, DLC**—Charts of monthly means and standard deviations of climatological and oceanographic elements are presented for locations throughout the Indian Ocean. The charts were compiled from ships' reports covering a period of more than a hundred years. The elements charted are cloud amount, fog, precipitation, air temperature, atmospheric circulation, pressure, wind, gales, tropical cyclones (charts of tracks by 10-day periods), ocean circulation and water temperature. The text contains references to the sources from which the charts were compiled, and comments on some of the peculiarities represented in them. *Subject Headings:* **1. Oceanographic data 2. Marine atlases 3. Marine climatic data 4. Indian Ocean.**—*G.T.*

10.4–69 551.584:551.46

Takahashi, Tadao, **Micro-meteorological observations and studies over the sea.** *Kagoshima, Japan. Univ. Faculty of Fisheries, Memoirs,* 6:1–46, March **1958.** 2 figs. (incl. photo), numerous tables, 14 refs., 8 eqs. **DWB.** Reprinted in *Kyoto. Univ. Meteorological Research Institute, Meteorological Notes,* Ser. 2, No. 12, **1958. DWB**—Observed data-wind speed, temperature, and vapor pressure at 5 levels above the sea surface up to the 400 cm height, evaporation from the sea surface, and wind wave elements obtained at Kagoshima Bay during 1953–1956 are given in Pt. I. In Pt. II, it is concluded that the layer of hydrodynamically smooth flow, surmounted with the hydrodynamically rough flow of land origin, always exists near the sea surface, and that the thickness (h) of the lower layer of smooth flow can be expressed by a rough empirical formula of $h = a\sqrt{t}$, where t is progressive time (ratio of fetch and wind speed at 400 cm height) and a is a constant depending upon stability condition, i.e., $a = 3.1$ (under stable condition)$\sim$20.0 (under strong instability). The critical values of friction velocity for the first formation of wind waves and the generation of whitecaps are determined empirically as 3.7 cm/sec and 17 cm/sec, respectively, in Pt. III; and humidity

profiles and evaporation from the sea surface are discussed in Pt. IV. *Subject Headings:* **1. Micrometeorological observations over sea surfaces 2. Ocean-atmosphere-interaction 3. Kagoshima Bay, Japan.**—*Author's abstract.*

10.4–70 551.46:532.5

†Kitaĭgorodskiĭ, S. A., **O koeffitsiente vertikal'nogo turbulentnogo obmena v more.** [Coefficient of the vertical turbulent exchange in the sea.] *Akademiia Nauk SSSR, Izvestiia, Ser Geof.*, 9:1118–1132, **1957.** 5 figs., 2 tables, 18 refs. **DWB**—The fundamental results of the application of a "semi-empirical theory of turbulence" to dynamic processes in the sea are examined. A simplified method for calculating the coefficient of turbulent exchange produced by the simultaneous action of wind waves and currents is used. The formula for turbulent exchange A is

$$A = \rho\left[\frac{x\lambda}{6\pi} + \frac{k(h-z)}{\sqrt{2}}\right]^2\left[\frac{2\pi^3 h^2_B}{\lambda^2 T}\, e^{-4\pi z/\lambda} + \frac{L\sqrt{2}}{3k^2}\, e^{i\psi}\right].$$

The parameters of this formula are calculated empirically. A comparative estimate of the role of wind waves and wind currents in the development of turbulence in the upper layer of a deep sea is presented. The calculated values of the coefficient of turbulent exchange are compared with other indirect determinations of this coefficient in the sea. Also, the expression for the coefficient of vertical turbulent exchange, associated with wind waves in a shallow sea, is examined. The formula is $A = cWH(1-\bar{z})^n$, where $n = 3/2$ and $c = 2k\sqrt{\rho j}$. *Subject Headings:* **1. Turbulent exchange coefficients 2. Turbulence coefficient calculations 3. Turbulent exchange in sea 4. Vertical turbulent exchange.**—*I.L.D. and author's abstract.*

10.4–71 551.463

Discolouration of sea. *Indian Journal of Meteorology and Geophysics*, Delhi, 7(1):67, Jan. **1956. DWB, DLC**—On Aug. 22, 1955 at 15°43′N, 53°30′E, streaks of reddish brown in contrast to normal deep sea green, covering ¾ of the visible horizon was seen; sea temp. 74°F, air temp. 76°F. Also, on Sept. 14, 1955, at 15°55′N, 82°42′E, Capt. D. M. E. Evans observed water changes of color from dark blue to sea green; sea temp. 82°, air temp. 85°F. *Subject Heading:* **1. Sea discoloration.**—*M.R.*

10.4–72 551.46(265)

Sugiura, J., **On the sea conditions in the Okhotsk Sea.** *Journal of Meteorological Research*, Tokyo, 10(7):549–553, July **1958.** 2 figs., 2 tables, 12 refs. In Japanese; English summary p. 549. **DLC**—Seasonal variations of the temperature, the chlorinity and the current velocity in the Soya Warm Current area and the Okhotsk cold water area were studied, based on 15 sets of oceanographic data taken in the period between 1948 and 1957. The results are as follows: (1) Temperature of the Soya Warm Current is above 4°C during the whole year, and the maximum temperature in the surface comes to 18°C in Aug., and that in the 50 m layer to 7°C in Sept. to Oct. (2) Temperature of the Okhotsk cold water in 100 m depth is below 1.0°C during the whole year, and that in the surface reaches the maximum value 17°C in August. (3) The width of the Soya Warm Current is about 25 mi near Soya-misaki, while it is reduced to about 10 mi near Notori-misaki. (4) Current velocity in the Okhotsk Sea is large in summer, the maximum value observed with the GEK (Geomagnetic Electro-Kinetograph) being 2.9 kt in the Soya Warm Current area and 1.3 kt in the Okhotsk cold water area. *Subject Headings:* **1. Oceanographic conditions 2. Okhotsk Sea.**—*Author's abstract.*

GLACIOLOGY AND ICE

See: **Project Jello, Greenland** (Benson, Ragle), 10.4–34; **Snow temp. & snow physics studies, Greenland,** 10.4–35; **Pack-ice disintegration anomalies, Arctic Seas** (Winchester, Bates), 10.4–181; **Ice drift-wind relationships, Arctic Ocean** (Drogaĭtsev), 10.4–244.

ASTRONAUTICS—SATELLITE OBSERVATORIES

See also: **Use of satellite data in weather forecasting** (Widger, Touart), 10.4–125.

10.4–73 629.19(038)

The space encyclopedia: a guide to astronomy and space research. N. Y., E. P. Dutton, **1957.** 287 p. numerous figs., photos, tables. Appended: November 1957 Supplement. 5 p. **DWB** (629.1388 S732)—A glossary of terms used in all fields of astronautics, space medicine, and associated astrophysical, geophysical and meteorological phenomena, arranged alphabetically, with many fine illustrations of equipment and results and observations. Such unrelated terms as zodiacal light, radar, solar prominences, falling sphere, galaxies, atmosphere, origin of earth, earth as seen from space, artificial earth satellite, etc. are described and illustrated. An appendix of 5 pages includes a description and illustration of the first Soviet Sputnik (Oct. 4, 1957), and the U. S. "Farside" Rocket which was shot on Oct. 21, 1957, reaching 4000 mi. *Subject Headings:* **1. Space encyclopedia 2. Astronautical glossaries.**—*M.R.*

10.4–74 551.507.362.2:621.397

Glaser, Arnold H. (*Allied Research Associates, Inc., Boston, Mass.*), **Satellite television for meteorology.** *Weatherwise*, Boston, 10(6):183–186, 213, Dec. **1957.** fig., photos. **DWB**—Suggestions for development of a satellite TV weather observation system involving rapid spin, photocell scanner and "memory" storage of information to be employed over areas remote from receiving stations. The information would be released in a "burst" while the satellite was over a ground receiver. The scanning would be in strips perpendicular to the trajectory of the satellite. The faster the spin of the satellite, the closer will be the strips but the poorer the resolution, unless the optical system is improved markedly. At present, objects of less than 1 mi diameter could not be seen and up to 10 mi objects would be fuzzy. Transmitters are not powerful or enduring enough to give desired resolution over months or years. *Subject Heading:* **1. Satellite television observation techniques.**—*M.R.*

10.4–75 551.510.536:551.507.362.2

Skuridin, G. A., and Kurnosova, L. V., **Nauchnye issledovaniia pri pomoshchi iskusstvennykh sputnikov Zemli.** [Scientific investigations by means of artificial earth satellites.] *Priroda*, Moscow, 46(12):7–14, Dec. **1957.** 6 figs. **DLC**—The successful launching on Nov. 3, 1957 of the second Soviet earth satellite, the information on its movement and the recordings of instruments mounted in it, make it possible to obtain very important data on atmospheric conditions at heights up to 1700 km, to measure the full intensity of cosmic rays at such heights and to register the ultraviolet and x-radiations of the sun. The authors examine some of the scientific problems where solutions seem to have become possible with the aid of earth satellites. These are investigations of: the short wave portions of the solar spectrum, the structure of the atmosphere, the corpuscular radiation of the sun, the solid component of interplanetary substance, and geomagnetic measurements. *Subject Headings:* **1. Satellite observations 2. Outer atmosphere structure 3. Corpuscular radiation 4. Geomagnetism.** —*A.M.P.*

10.4–76 629.19

Kraus, J. D. and Dreese, E. E., **Sputnik I's last days in orbit.** *Institute of Radio Engineers, Proceedings*, 46(9):1580–1587, Sept. **1958.** 7 figs., foot-refs., 2 eqs. **DLC**—Observations during the last days of Sputnik I's orbiting are presented. These observations were made at the Ohio State Univ. Radio Observatory, using a simple CW reflection technique. The data suggest that the breakup of an artificial satellite upon its re-entry into the denser atmosphere is a complex phenomenon in which a sequential series of events may occur over a period of days. Graphs of the average height of the satellite and its associated fragments as a function of time are presented, and some conclusions are drawn as to the details of the actual breakup phenomenon. *Subject Headings:* **1. Satellite breakup 2. Sputniks.**—*Authors' abstract.*

10.4–77 551.507.362.2

Put' v kosmos: materialy gazety "Pravda" o trekh sovetskikh iskusstvennykh sputnikakh Zemli. [Journey into space: material from "Pravda" on the three Soviet artificial earth satellites.] Moscow, Izdat. "Pravda," **1958.** 319 p. figs., photos. **DWB**—A popular book (50,000 copies) consisting of about 70 articles, many by top scientists or academicians, on the 3 Soviet sputniks and their scientific results to date. The articles are grouped into 6 chapters: (1) the first Soviet artificial satellite, (2) comments by scientists in the U.S.S.R., (3) comments from foreign scientists, (4) the second artificial satellite, (5) some notes on the scientific results of the first sputniks, (6) the third Soviet satellite. *Subject Headings:* **1. Satellite observatories 2. Sputniks.**—*M.R.*

10.4–78 551.510.536 551.586:59 629.19

Affronti, Filippo, **L'esplorazione dell'atmosfera con l'ausilio di esseri viventi.** [Exploration of the atmosphere with the aid of living beings.] *Rivista di Meteorologia Aeronautica*, Rome, 18(2):40–49, April/June **1958.** 5 figs., 4 ft.-refs. In Italian; Italian, French, English and German summaries p. 40. **DLC**—A dog carried to the highest limits of the atmosphere in Nov. 1957 stirred general interest throughout the world. In the present survey, the most famous cases in which animals were used in the exploration of the atmosphere are recalled. *Subject Headings:* **1. Upper atmosphere research with animals 2. Biometeorology 3. Space travel.**—*Author's abstract.*

AERONAUTICAL METEOROLOGY

See also: **Aviation met. services, U.S.S.R.** (Brodskiĭ), 10.4–43; **Atmos. turbulence and airborne gust recorders** (Notess), 10.4–229; **Free air turbulence meas., U. S.** (Anderson), 10.4–232; **Airport visibility, Hungary** (Lepp, Rajkay), 10.4–303.

10.4–79 551.557

§Alt, J. and Germain, H., **La protection météorologique des vols de la "Caravelle" d'avril et juin 1957.** [Meteorological service for flights of the "Caravelle," April and June 1957.] *La Météorologie*, Paris, Ser. 4, No. 48:515–536, Oct./Dec. **1957.** 17 figs. French, English and Spanish summaries p. 515. **DWB**—In this report of the journey made by the "Caravelle," the authors have endeavored to study the conditions under which the winds could be predicted for flights at high altitudes, both in temperate regions and in the tropics. This is, indeed, the greatest problem for that type of flight, since weather forecasting for the route and for landing is essentially the same as before. *Subject Heading:* **1. Upper air winds.**—*Authors' abstract.*

10.4–80 629.135:551.515.4

Banfe, Chuck, **Pilot versus thunderstorm.** *Flying*, N. Y., 60(6):28–30, 80–82, June **1957.** photo. **DWB**—Thunderstorm cells in the primary, mature and the dissipating stage are discussed in relation to flight navigation. Several safety and countermeasures as well as instrumental aids are mentioned, but above all the individual qualifications of a pilot are stressed. *Subject Heading:* **1. Thunderstorm effects on aircraft.**—*W.N.*

10.4–81 551.507.351:551.506.2

Kasza, József, **50 Tage Wellenjagd—Ungarische Wellenflüge 1957.** [Sailplaning in Hungary in 1957 (50-day period).] *Schweizer Aero-Revue*, Berne, 33(6):314–316, June **1958.** 6 figs.—The author gives a description of the technical organization as well as a description of the various flights performed above the Mátra Mountains, 70 km northeast of Budapest. The article contains a commentary on the atmospheric situation Dec. 1 and 2, 1957. The weather maps, as well as the diagrams of the soundings carried out on these two dates, are reproduced. *Subject Headings:* **1. Gliding weather 2. Gliding championships 3. Mátra Mountains, Hungary.**—*A.V.*

10.4–82 551.552:656.71

Lenhard, Robert W., Jr. (*Andrews Air Force Base*) and Foard, John M. (*Rhein Main A. F. Base*), **Determining the availability of existing runways.** *American Meteorological Society,*

Bulletin, 39(5):253–257, May **1958.** 5 figs., 5 tables, 2 refs. **DWB, DLC**—A method is presented for determining the probability of occurrence of all combinations of crosswind and runway wind components at an airport. It is applied to Prestwick, Scotland for the existing instrument runway and for winds occurring with ceilings less than 1000 ft and/or visibilities less than three miles. *Subject Headings:* **1. Cross winds 2. Airport usability 3. Ceiling and visibility 4. Prestwick, Scotland.**—*Authors' abstract.*

10.4–83 551.542:629.13

Polhemus, William L. (*USAF 98th Bombardment Wing, Lincoln AFB, Neb.*), **A simplified method of pressure pattern navigation.** *Navigation*, Los Angeles, 5(8):401–407, Winter **1957–58.** 4 figs. **DWB, DLC**—The author supports the accuracy of the Bellamy drift and pressure line technique being used for celestial navigation and eventual landing. He evaluates the doubts and fears of various experienced and inexperienced navigators. Investigation and experience proves that the proper use of graphs in pre-flight will make for some extra free minutes in the air. This will in no way lessen the accuracy of the pressure pattern technique. Graphically, methods of finding distances for PLOP and drift angles are illustrated. Tables of "Y" factors for determining the Bellamy Drift Correction Angle without the use of any computers are given here. *Subject Heading:* **1. Pressure pattern flying.**—*N.N.*

10.4–84 551.542:629.13

Polson, Robert K. (*Flight Navigator, Pan American World Airways*), **The case for flexible air navigational tracks on the North Atlantic.** *Navigation*, Los Angeles, 5(7):337–344, Autumn **1957.** 9 figs., 5 refs. **DWB, DLC**—Since 1954 Pan American World Airways has preferred the flexible air navigation track, or the least time track, to any other forms of pressure pattern flight because of its money-saving as well as its time-saving importance. Gives expenses and savings since this method was undertaken. Discusses the effects of increased air-speed on LTT benefits, on construction of operating data, on Eastbound Least Time Tracks, on the behavior of Westbound LTT's, on the resolution of fixed tracks versus flexible tracks, which depend on question of structure of upper air and on oceanic traffic control problems. Assumptions offered are based on meteorological progs that are illustrated. *Subject Heading:* **1. Pressure pattern flying.**—*N.N.*

AGRICULTURAL METEOROLOGY

See also: **Agromet. conf., Hamburg, Germany** (Bourke), 10.4–48; **Agricultural climatology, Oregon, U. S.** (Sternes), 10.4–283.

10.4–85 551.584.4:623.49

Abe, I. and Takahashi, S. (*both, Tōhoku Natl. Agric. Experiment Station*), **Agro-climatic studies on the direction of rows in the potato fields.** *Journal of Agricultural Meteorology*, Tokyo, 13(1):33–36, July **1957.** 2 figs., 4 tables, 4 refs. In Japanese; English summary p. 36. **DWB**—In 1953 and 1954, experiments were made to determine the microclimate in potato fields, and the growth and yield of potato rows laid out in different directions (S to N, E to W). Varieties of potatoes used: Danshaku (Irish Cobbler) and Nōrin No. 1, in 1953; Danshaku and Sanen (Vermont Gold Coin), in 1954. The results obtained were as follows: (1) In the early stage of growth, the soil temperature of E to W rows was lower than that of S to N. On the contrary, in the later stage, the soil temperature of E to W rows was higher than that of S to N rows. (2) In the later stage, the vertical distribution of air temperature in E to W rows was higher than that of S to N rows. It seemed that the differences of air temperature were related to the wind direction in the potato fields. (3) In the mature stage, more tubers weighing over 120 g were produced in S to N rows. *Subject Headings:* **1. Potato field microclimatology 2. Potato fields 3. Potato row direction—crop yield relationships.**—*Authors' abstract.*

10.4–86 551.586:633.11

Baldwin, J. L. (*Office of Climatology, U. S. W. B., Wash., D. C.*), **Climate and world's wheat culture.** *U. S. Weather Bureau, Weekly Weather and Crop Bulletin*, 43(21):7–8, May

21, 1956. **DWB, DLC, DA**—Wheat, in a broad sense, is a type of grass. Principal factors that limit its growth are: short freeze-free seasons, low temperatures, deficient soil moisture and the prevalence of rust. The last is induced by a spell of warm, humid weather. Wheat must have enough fair weather to allow seeding, a long and rather moist winter, abundant sunshine and rather dry air towards the harvest. The average annual precipitation for its culture ranges from about 10 to 30 in. Spring and winter wheat grains in the Great Plains of North America are comparable to those of southeastern Europe and southwestern U.S.S.R. *Subject Headings:* **1. Wheat cultivation 2. Climatic effects on wheat.**—*N.N.*

10.4–87 551.521.1:551.524.1:63 551.586:63

Borisoglebskiĭ, G. I., **Agrometeorologicheskie usloviia, vyzyvaiushchie gibel' ozimykh kul'tur v raniiĭ vesenniĭ period.** [Agrometeorological conditions responsible for the loss of winter crops in early spring.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 47(74): 74–85, 1956. 8 tables, 8 refs. **DLC**—Results of a study of the problem, carried out under the author's supervision in 1951–1954. The main meteorological factor causing the failure of winter crops in early spring is sharp temperature fluctuations. The destructive effect of temperature variations is intensified by the effect of direct solar radiation. The failure of winter crops in early spring depends on the condition of plants at the time of the snow melting, on the range of temperature fluctuation, and on the quantity of direct solar radiation reaching the plants. *Subject Headings:* **1. Solar radiation effects on plants 2. Temperature fluctuation effects on plants 3. Crop losses.**—*A.M.P.*

10.4–88 551.584 551.555.3:63

Tsuberbiller, E. A. and Belukhina, G. V., **K metodike agrometeorologicheskoĭ otsenki sukhoveev v usloviiakh oroshaemogo zemledeliia.** [Method of evaluating agrometeorologically sukhovei in irrigated agricultural areas.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 47(74):65–73, 1956. 3 tables, 9 refs. **DLC**—Detailed studies of sukhovei effects on wheat crops in irrigated areas, carried out during investigations of the Central Institute of Forecasting (TSIP) in 1952–1953 at Ershovo (Saratov Oblast) and Dzhankoi (Crimea), showed that there are 3 quantitative indices for evaluating meteorologically dry wind weather: 1) the possibility of damage caused to plants; 2) the evaporation coefficient below .5 and .3, observed during several hours or days, which indicates the pressure of damage (light or considerable); 3) a steady excess of moisture deficiency in the grass cover over moisture deficiency at 2 m height. *Subject Headings:* **1. Sukhovei effects on agriculture 2. Grass microclimatology.**—*A.M.P.*

10.4–89 551.5:63:92

Ulanova, E. S., **25 let deiatel'nosti po agrometeorologicheskomu obsluzhivaniiu sel'skogo khoziaĭstva.** [25 years of agrometeorological activity in the service of agriculture.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:66–67, May 1957. **DWB**—Alekseĭ Vladimirovich Protzerov celebrated his 60th birthday on March 4, 1957. He was one of the organizers of a service for water supply information to agriculture and developed quantitative methods for evaluating complicated and expected conditions for the growth of farm crops. His scientific work includes studies of drought, water balance of soil, irrigation problems, etc. *Subject Headings:* **1. Agrometeorological services 2. Biography of A. V. Protzerov 3. Protzerov, Alekseĭ V.**—*I.L.D.*

10.4–90 551.586:633.51

Yathom, S., **Biology of the spiny boll worm.** *Ktavim*, Israel, 7(1):43–57, 1956. 5 figs., 5 tables, 10 refs.—Laboratory breeding of *Earias insulana*, in which the threshold of development for each stage was calculated according to the Blunck formula, shows that at the climatic conditions prevailing during the cotton season in Israel (June–Nov.), the life cycle covers 23–29 days, as follows: 3 days—incubation of the egg; 9–10 days—development of the larva; 8–10 days—development of the pupa; and 3–6 days—pre-oviposition period. It was found that there are seasonal changes in the coloration of the adult: all summer moths are green, but many winter moths are yellow. Temperature is an important factor in oviposition; high tem-

peratures (28°–29°C) shorten the pre-oviposition period, but may also cause females to die prematurely. *Subject Headings:* **1. Spiny bollworm 2. Cotton diseases 3. Israel.**—*Author's abstract.*

FOREST METEOROLOGY AND FIRE WEATHER

See also: **Forced convection and stability effects on fires** (Scesa), 10.4–11.

10.4–91 634.0.2

Onufrienko, L. G., **Karta otnositel'noĭ lesistosti territorii Ukrainy.** [Map showing the relative forest densities in the Ukraine.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologischeskiĭ Institut, Trudy,* 4:77, **1955.** map (fold). **DLC**—This map, showing the relative forest cover in the Ukraine, is based on data of 1953 for a forest inventory of the Ukrainian SSR. The method consisted of calculating the percent of forest cover of each square of the geographic network 20′ lat. by 20′ long. The percent values for each square were arranged in 12 graduations. *Subject Headings:* **1. Forest densities 2. Ukrainian SSR.**—*I.L.D.*

10.4–92 634.0.4

Reed, John C., Jr. (*U. S. Geological Survey, Denver, Colo.*), and Harms, John C. (*Dept. of Geology, Univ. of Colorado, Boulder*), **Rates of tree growth and forest succession in the Anchorage-Matanuska Valley area, Alaska.** *Arctic,* Ottawa, 9(4):239–248, **1956.** 10 figs. (inc. photos), table, 3 refs. **DLC**—Rate of tree growth in the area is more dependent on sunlight and drainage than on soil type or surface geology. The oldest trees give the best indication of growth rate, for the younger shaded trees may not do so well. Some species (e.g., poplar) grow a lot faster than others (e.g., black spruce). The succession following forest fires on well-drained sites is usually birch-aspen-cottonwood or willow to birch-white spruce. *Subject Headings:* **1. Forest succession 2. Tree growth rate 3. Matanuska Valley, Alaska.**—*M.R.*

10.4–93 551.555:632.187

*Cramer, Owen P., **Frequency of dry east winds over northwest Oregon and southwest Washington.** *U. S. Forest Service. Pacific Northwest Forest and Range Experiment Station, Research Paper,* No. 24, Sept. **1957.** 19 p. 3 figs., 15 refs. **DWB** (M53 C889fr)—Pilot balloon data for Portland, Oreg. for 1934–44 and 1948–54 are tabulated to obtain the monthly frequency of easterly winds at 3 levels (surface, 1640 and 4920 ft) as indicative of the number of days per month with parching or very dry conditions conducive to blow-up fires at three levels in the forests of western Washington and Oregon. In the appendix, the major east wind types are designated and described. A graph shows close correlation of frequency of east winds in northwest Oregon and southwest Washington, and at 1640 ft at Portland. Surface east winds are most frequent in fall and spring; and at 1640 ft in winter and at 4920 ft in fall. *Subject Headings:* **1. Dry east wind frequency 2. Fire weather studies 3. Western Washington State 4. Portland, Oregon.**—*M.R.*

INDUSTRIAL METEOROLOGY

See also: **Industrial site planning** (Danis), 10.4–146; **Solar radiation through skylights** (Vild, Parmelle), 10.4–209.

10.4–94 551.5:665.54

Booth, A. W. (*Illinois Univ.*), **Petroleum refining and selected chemical industries.** *Meteorological Monographs* (American Meteorological Society), Boston, 2(9):104–111, May **1957.** 17 refs. **DWB, DLC**—The author summarizes available knowledge on the effect of weather elements upon the operations of petroleum refining, synthetic ammonia, synthetic rubber and the coke chemical industries. The way in which low and high temperatures influence the efficiency of operations, water supply and measures needed to overcome the disadvantages imposed by these factors, and the influence of rapid temperature changes of rainfall, snowfall, high atmospheric humidity and winds, including hurricanes, are discussed. The unfavorable weather conditions for efficient operations are very high temperatures, tem-

peratures below 20°F, heavy rainfall or snowfall within a brief period of time, constant high atmospheric humidity and winds of very high speeds. *Subject Headings:* **1. Weather effects on petroleum refining 2. Oil refining.**—*I.L.D.*

10.4–95 551.58:628.1 551.579

†Abu-Lughod, J.; Roberts, W. J.; Stall, J. B. and Hudson, H. E., Jr. (*all, Illinois State Water Survey Div.*), **Problems of industrial water in areas of extreme weather conditions.** *Meteorological Monographs* (American Meteorological Society), Boston, 2(9):66–86, May **1957.** 8 figs., 2 tables, 68 refs. **DWB, DLC**—This paper discusses aspects of industrial water requirements and conservation methods applicable to nearly all types of industrial establishments in the light of influence of extreme climatic conditions. The contents of this paper cover the following: major industrial uses of water, variability of water requirements, water conservation methods in areas of extreme conditions in relation to refrigeration, evaporative cooling, water quality and water disposal; effect of climate upon water supply; specific effects of weather upon surface water, including rainfall-runoff relationships in particular climatic subdivisions of Koppen classifications; reservoir design; development distribution and handling of water, extreme climates, and of ground water; and estimation of available water for areas with meager data. A nomograph for solution of problems involving unit discharge of stream water demand and drainage area, a map showing drainage basins in Köppen climatic zones for North America, a diagram showing the occurrence of ground water on the permafrost region, a table giving probable stream flow extremes in various climatic provinces, etc. are presented. *Subject Headings:* **1. Industrial water requirements 2. Water conservation-drought relationships 3. Köppen's classification 4. Climatic effects on water supply.**—*I.L.D.*

10.4–96 551.509:519.2

†Malone, Thomas F. (*Travelers Weather Research Center*), **Applied meteorology.** *Meteorological Monographs* (American Meteorological Society), Boston, 3(12–20):152–159, July **1957.** Bibliog. p. 158–159, 2 eqs. **DWB, DLC**—The nature of the meteorological problem of prediction is discussed at considerable length. The author examines the limitations to prediction imposed by the thermodynamic and hydrodynamic complexity of the atmosphere, its inherent instability impressions in characterizing the initial state of the atmosphere, the possible lack of complete determination in the atmosphere, the determination of the probable final distribution of the meteorological variables, and some of the statistical procedures used to obtain final distributions. The application of probability forecasts to an operational decision is illustrated by the prediction of precipitation in the Los Angeles area, by the use of probability of weather conditions to the dispatch of commercial aircraft, by the application of the probability of forecasts of thunderstorm occurrence to scheduling stand-by or overtime crews for telephone line maintenance, etc. *Subject Headings:* **1. Weather forecasting 2. Probability forecasting.**—*I.L.D.*

10.4–97 551.574.42:621.315

Muretov, N. S., **Organizatsiia izucheniia iavlenii obledeneniia provodov.** [Organization of research on the icing of power lines.] *Meteorologiia i Gidrologiia*, No. 2:49–52, Feb. **1957.** 5 figs. **DWB, DLC**—Observations on the icing of power lines began in 1923, and the development of research on the icing of power lines in the U.S.S.R. is described briefly. Institutions involved in this research are listed and the work carried on by the TSINEL MES is described with illustrations. A graph giving the correction coefficient (K) for computing the influence of elevation of power line support upon the thickness of the glaze and rime accumulation is presented. *Subject Headings:* **1. Icing of transmission lines 2. Icing research 3. U.S.S.R.** —*I.L.D.*

10.4–98 551.510.3:551.588.2:621.63

Rogers, A. N. (*Sales Development Sec., Westinghouse Electric Corp., Hyde Park, Mass.*), **How temperature and altitude effect fan selection.** *Air Conditioning, Heating and Ventilating*, N. Y., 53(12):92–96, Dec. **1956.** 4 figs., 2 tables, eqs. **DLC**—Tables give air density ratios at different temperatures and altitudes (pressures) from sea level to 20,000 ft for use in determining fan operation or selection. The volume of air handled by a fan is constant, regardless of

density of the air, but the power required increases linearly with the density. Pressure, volume and other characteristics of fans are also shown in graphs. Density is about 50% of sea level (70°F) value at 18,000 ft if air temp. is 70°F, but at only 9000 ft at 300°F and at 3000 ft at 500°F. *Subject Headings:* **1. Air density effects on fans 2. Altitude effects on fans.** —*M.R.*

10.4–99 551.582.3(52)

Kubo, J., **Climatic map used for industrial location.** *Japan. Meteorological Agency, Tokyo, Memoirs of Industrial Meteorology,* 21(1):55–65, **1957.** 8 figs., table, 4 refs. In Japanese; English summary p. 65. **DLC**—Climate is a factor to be considered in industrial location and design, but the means and extremes contained in old climatic tables are often insufficient for these industrial purposes. Recently, the monthly (or annual) numbers of days with specified air temperature, precipitation amount, wind velocity and relative humidity were tabulated in the **Annual Report** (Pt. 2) of the Japan Meteorological Agency. Using the table of the annual number of days with minimum relative humidity, the author has made a diagram in which the percentage of the annual number of days with minimum relative humidity in the day ≦optional limit value is easily obtained. The diagrams for 147 places in Japan are shown in Figs. 1–7. As an example for the use of the diagram for industrial location, the limit value of 40% has been selected. Then the percentages of the annual number of days with minimum relative humidity in the day ≦40% at 147 places in Japan are obtained from Figs. 1–7, and the distribution is shown in Fig. 8. *Subject Headings:* **1. Climatic charts 2. Industrial site planning 3. Japan.**—*Author's abstract.*

MEDICAL METEOROLOGY

See also: **Clothing, Arctic** (Dusek), 10.4–33; **Bioclimat. symposia** (Buettner), 10.4–49; **Body temp. and weather sensitivity** (Zenker), 10.4–294.

10.4–100 551.586:61:061.3

Knepple, R., **3. Medizin-meteorologische Arbeitstagung in Hamburg 13. bis 15. Juni 1957.** [Third Medical-Meteorological Workshop in Hamburg, June 13–15, 1957.] *Angewandte Meteorologie,* 3(2):63–64, **1957. DLC**—The subjects discussed at this workshop were as follows: medical-meteorological aspects of health resorts; weather and human well-being; föhn and föhn effects; and atmospheric radiation and human well-being. Individual papers and authors are listed in this article. With regard to föhn, it was decided to limit this term to true mountain föhn and not to apply it to descending air movements, and to distinguish between biological and meteorological föhn. Also evidence of the increasing radioactivity of air was presented. *Subject Heading:* **1. Medical meteorology conferences.**—*I.L.D.*

10.4–101 551.524.36:551.586:616.322

Koĭranskiĭ, B. B. and Zaks, R. A., **Rol' meteorologicheskikh uslovii proizvodstvennykh pomeshcheniĭ v etiologii angin.** [Role of meteorological conditions of industrial premises in the etiology of tonsilitis.] *Gigiena i Sanitariia,* Moscow, 23(2):34–39, Feb. **1958.** fig., 2 tables, 6 refs. English summary p. 39. **DLC. Comment** by L. K. Khotsianov and G. I. Petrov, *Ibid.,* No. 4:66–67, April **1958. Comment** by A. I. Pakhomychev, *Ibid.,* No. 4:68–70, April **1958.**—The authors have analyzed the incidence of tonsilitis in Leningrad. For the period 1925–1950 there were 480,000 sick workers and in 1951–1955 there were 291,000. It is found that there was a rise of mortality rate for several years, then a fall, followed by another rise lasting several years, etc. The second type of periodicity manifests itself in seasonal curves. The number of cases increases in the third and fourth quarter of the year and falls to its minimum in the second quarter. The earlier incidence of tonsilitis (Sept.–Oct.) in comparison with the cases of acute catarrh of the upper respiratory tract may be explained by the fact that the tonsils are less protected from direct action of cold than the rest of the respiratory tract. The earlier decrease of tonsilitis incidence (Jan.–Feb.) is due to the adaptation of the tonsils as a result of lengthy and repeated action of cold. *Subject Headings:* **1. Cold effects on respiratory tract 2. Tonsilitis 3. Leningrad, U.S.S.R.**—*From authors' abstract.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Soviet ice floe stations** (Burkhanov), 10.4–16; **Noctilucent cloud obs. instructions,** 10.4–26; **Hist. of met. networks, Florence** (Bilancini), 10.4–58; **Press. reductions and nomograms,** 10.4–226; **Precipitation belts and radar winds, S.E. England** (Harper, Beimers), 10.4–264; **Atmospheric electricity measurement** (Little), 10.4–308; bibliog. on **Sferics,** p. 588.

104–102 551.501:551.508.77:551.578.4

Bartishvili, I. T., **K voprosu opredeleniia kolichestva zimnikh osadkov po sposobu snegomernykh s"emok.** [The problem of determining the amount of winter precipitation by means of snow-measuring surveys.] *Meteorologiia i Gidrologiia,* No. 1:47, Jan. **1957.** **DWB, DLC**—The Tret'iakov rain gage in the Kazbega Mountain Observatory has shown that the mean precipitation during the winter is 4.3 as much as that measured by the ordinary rain gage. In the southern regions of the U.S.S.R., particularly in the Transcaucasus, where winter conditions are intermittent and rain instead of snow may fall during the winter and where snow melt also occurs, much of the precipitation would not be accounted for by snow surveys. Hence, a suitable rain gage and a method for improving the measurement of precipitation by taking into account the relief of a locality would provide a better measure of amount of solid precipitation than snow surveys. *Subject Headings:* **1. Snow surveys 2. Snowfall measurement techniques.**—*I.L.D.*

10.4–103 551.501.1:551.524

Ichikawa, J. and Nose, T., **On the time lag in temperature observation.** *Japan. Meteorological Agency, Tokyo, Memoirs of Industrial Meteorology,* 21(1):51–54, **1957.** 2 figs. In Japanese; English summary p. 54. **DLC**—It requires a considerable time to observe with one thermometer the air temperature at two places where the temperature difference is great (about 10°C). So the authors have tried to determine the time necessary for getting the true temperature by setting up a mercury thermometer in a paste-board box (Case 1) and in one of the two tubes of Assmann's aspirated psychrometer (Case 2). The results are as follows: (A) In Case 1, it takes about 15 min. (B) In Case 2, it takes about 7 min. (C) The larger the volume of mercury, the longer the time required. (D) When the first temperature is low, or when it is high, the same curve is obtained. The element which decides the time for reaching the true temperature is always the temperature difference only. *Subject Heading:* **1. Temperature observation.**—*Authors' abstract.*

10.4–104 551.501.3:551.55

Brooks, Charles F. and Brooks, Eleanor S. (*both, Harvard Univ., Blue Hill Met. Obs., Mass.*), **The accuracy of wind-speed estimates at sea.** *American Geophysical Union, Transactions,* 39(1):52–57, Feb. **1958.** 6 figs., 6 tables, 18 refs. **DWB, DLC**—Most wind reports at sea come from merchant ships without anemometers. The Beaufort scale is used, the units of which are now defined principally in terms of sea disturbance. A study of 1315 pairs of measured and estimated winds made on U. S. weather ships shows that the estimated speeds corresponded to those measured within 1–3 kn (same Beaufort number) in 60% of the cases; 28% were underestimated and 12% overestimated. The greater frequency of underestimates than of overestimates is apparently due mainly to the fact that the anemometers (at 20–30 m) on the weather ships are higher than the (10 m) elevation for which the speed equivalents of the Beaufort scale were established, but partly also to the extra mileage of the anemometer due to the rolling and pitching of the ship. Changes in wind speed occur so often that lag in the reaction of the sea is the most common cause of error in estimates. Another source of trouble is the sea-air temperature difference, a cold wind relative to the sea producing larger waves than a warm wind. Decreasing winds that are also cold are especially likely to be overestimated, and increasing ones that are warm, underestimated. *Subject Headings:* **1. Wind speed estimation at sea 2. Beaufort scale 3. Wind speed estimation accuracy.**—*Authors' abstract.*

10.4–105 551.501.4:551.58

Schumann, T. E. W., **On the publication of meteorological data and the rationalization f climatological frequency tables.** *South Africa. Weather Bureau, Notos*, 6(1/2):3–5, **1957.** refs., 2 eqs. **DWB**—The problem presented by the publication of meteorological data in verwhelming profusion is briefly discussed. It is suggested that climatological frequency istributions be expressed in terms of a minimum number of suitable parameters, whereby he publication of lengthy frequency tables can be avoided. After thorough investigation by a anel of experts, the most suitable parameters for characterizing the frequency distributions f rainfall, wind, temperature, pressure, etc. should be recommended by WMO with a view o their international adoption. *Subject Headings:* **1. Climatological data presentation 2. Fre- uency distribution standards.**—*Author's abstract.*

10.4–106 551.501.4:551.591

Semenov, G. A., **Lineĭka dlia opredeleniia uglovykh razmerov.** [Ruler for measuring ngles.] *Meteorologiia i Gidrologiia*, Leningrad, No. 2:48, Feb. **1956.** 2 figs. **DWB, DLC**— description with the aid of diagrams of the construction of a ruler for measuring angles of bjects in the determination of visibility. The ruler is based principally upon the relationship f a degree of curvature to a centimeter when the radius of curvature is equal to 565.5 mm; ne degree of curvature being equal to 1 cm, and 1 mm to 6 min. The ruler is made of celluloid nd is subdivided with centimeters and millimeters. The measurement procedure is described n detail. *Subject Headings:* **1. Visibility measurement techniques 2. Visibility measuring evice.**—*I.L.D.*

10.4–107 551.501.8:551.587

*U. S. Weather Bureau, **Radiosonde observation computation tables and diagrams.** Vash., D. C., U. S. Weather Bureau, Rev. Oct. **1956.** 119 p. 4 diagrams, 22 tables. Price: 1.25 from U. S. Govt. Print. Off. **DWB** (M01.4 U587ra)—Extensive and detailed tables or conversion of wind speed, temperature, pressure, etc., and for determining relative humidity also ice-water conversion), distances between standard isobaric surfaces, heights from pressure, emperature corrections, height of 1000 and 850 mb surface, ascension rates of balloons, etc. 'omograms are presented for determining solar radiation correction, solar elevation from date nd latitude, etc. *Subject Headings:* **1. Radiosonde computation tables 2. Conversion tables.** *-M.R.*

10.4–108 551.501.771:551.571.7

Rao, K. N., (*Regional Met. Center, India Met. Dept., Bombay*), **Regression of vapour ressure with height, latitude and longitude.** *Meteorological Society of Japan, Tokyo, 75th nniversary Vol. of the Journal*, pub. Nov. **1957.** p. 342–349. 9 tables, 3 refs. **DWB, DLC**— he most well-known relation for the rate of decrease of vapor pressure with height is due to ANN and is given by

$$e_z = e_0 \cdot 10^{\frac{z}{6300}}$$

$$= e_0 \exp\left(-\frac{Z}{\lambda}\right)$$

here e_z = vapor pressure at height Z (meters), e_0 = vapor pressure at height Z m below the ation. $\lambda = 2736$. According to this, vapor pressure at 1 km above surface is about .7 of the rface value and reduces to a third at 3 kms. This equation (1) is known to be an empirical lation and HANN deduced it from hygrometric observations made at various mountain ations on the Himalayas, Mount Ararat, Teneriffe and the Alps. As has been remarked in e notes on Table 86 of **Smithsonian Meteorological Tables** (5th ed.), the relation is an average ue for all times and places from which the actual rate of decrease of vapor pressure in any dividual case may widely differ. *Subject Heading:* **1. Vapor pressure gradient.**—*Author's stract.*

10.4–109 551.501.45:551.577.

Amaral, Edilberto and Mota, Fernando Silveira da (*both of the Institute*), **Normais variabilidade relativa das precipitações mensais.** [Norms and relative variation of monthl rainfall.] *Pelotas, Rio Grande do Sul. Instituto Agronômico do Sul, Boletim Técnico*, No. 1 May 1956. 10 p. 10 figs., 19 refs., eqs. English summary p. 9. **DWB**—The relation c standard deviation (σx) to the monthly amounts of precipitation (x) can be expressed a $\sigma x = ax + b$ for each station. The authors propose the transformation $y = ly(x + b/a)$. The average these values, obtaining $\bar{y}$, and claim that $10\bar{y} - b/a$ is a representative normal precipita tion value. Being based upon a symmetrical distribution, it should be better than the arith metic average and suitable for studies of the water budget of the soil. A "relative variability factor is also introduced, characterizing the stability of precipitation for each month. *Subje Headings:* **1. Statistical analysis 2. Rainfall statistics 3. Brazil.**—*A.A.*

10.4–110 551.501.45:519.241.

Dębski, Kazimierz (*Haute École d'Agriculture, Warsaw*), **Lignes courbes de probabilit des phénomènes hydrologiques et météorologiques.** [Probability curves of hydrological an meteorological phenomena.] *Acta Geophysica Polonica*, Warsaw, 4(2):59–90, 1956. 9 figs., tables, 4 refs., 22 eqs. **DWB, DLC**—The principles of normal and skewed frequency distri butions and a system of characteristic parameters are explained. The advantages of using th decile method are stressed. The use of parabolic and hyperbolic auxiliary functions is show and, finally, tables of frequency distributions are given. *Subject Headings:* **1. Frequenc distributions 2. Statistical methods in meteorology.**—*A.A.*

OBSERVATIONAL DATA

See also: **Annual met. obs. data, Australian Archipelago,** 10.4–39; **Yugoslav aerological service** (Vujičić-Gamser), 10.4–41; **Int. Polar Year, 1882–1883** (Nicolet), 10.4–54; **Gliding weather, Mátra Mts., Hungary** (Kasza), 10.4–81; **Sukhovei, Voroshilovgrad, U.S.S.R.** (Buchinskiĭ), 10.4–239.

10.4–111 551.506.7:551.508.82

Ludlam, F. H. and Saunders, P. M., **Comparison of aerological soundings made simul taneously by radio-sonde and aircraft.** *Tellus*, Stockholm, 10(1):83–87, Feb. 1958. 5 figs. 6 refs. **DWB, DLC**—On five separate occasions, soundings were made at the same time by Väisälä radiosonde and by an aircraft equipped with electrical resistance thermometers. Display of the results leads to the conclusion that the temperature indicated by the radiosond was too high by an amount which usually was between 1 and 1½°C, but occasionally reache 2½ to 3½°C. The usual difference can be accounted for by the known effects of lag and radiation error, and it is recommended that, even in the lower troposphere, appropriate correction should be made as a routine in conditions of sunny weather and steep lapse rate. Because o the excessive lag often shown by the radiosonde hygrometer unit (of hair), shallow layers o very dry air are not indicated at all in the radiosonde soundings. *Subject Headings:* **1. Radio sonde—aircraft sounding comparisons 2. Electrical resistance thermometers 3. Radiosond errors.**—*Authors' abstract.*

10.4–112 551.506.7:551.557(68

Schmitt, Wendelin (*South African Weather Bureau, Pretoria*), **Upper flow patterns ove tropical southern Africa during the period July 1955–January 1956, based on rawin observa tions.** (In: Angola. Servico Meteorológico, **Miscelanea geofisica.** Luanda, 1956. p. 87 100, 9 figs., table, 5 refs., 4 eqs. **DWB** (M(08) A592mi)—Mean monthly vector winds fo pressure levels 800, 700, 600, 500, 400, 300, 200 and 100 mb, and mean monthly thermal vect winds for the intermediate layers are presented in figs. for 9 rawin stations in Africa betwee 6°N and 25°S for the period July 1955 (southern mid-winter) until Jan. 1956 (southern mi summer). The graphs also show isopleths of the constancy of upper winds and limits of laye with cyclonic and anticyclonic vertical wind shear. Significant features of the upper flo patterns up to the 100 mb level and their major changes during the period investigated a discussed. *Subject Headings:* **1. Upper air wind data 2. Tropical Southern Africa.**—*Autho abstract.*

10.4–113 551.506.8:634.53(43)

Brandtner, E. and Essenwanger, O., **Zur Statistik phänologischer Daten.** [Statistics of henological dates.] *Meteorologische Rundschau*, Berlin, 10(5):151–156, Sept./Oct. **1957.** figs., 8 refs., 2 eqs. **DWB, DLC**—Phenological data on the blossoming of horse chestnuts the Rhine-Main Valley are analyzed statistically on the basis of the hypothesis that phenogical frequency distributions consist of partial collectives which again as individual collectives orrespond to normal distributions. An analysis of data on the beginning of blossoming over he period 1925–1954 indicates the pressure of two large collectives, each with a normal disribution. Hence, such measures as mean and standard deviation possess only a formal eaning for the total material; physical meaning can be obtained only if these values are etermined for the partial collectives. In the first group, blossoming begins between 100–126 ays (10 April–6 May) and in the second group between 117–137 days. (27 April–17 May). is shown that, despite the heterogeneity of plant varieties or the influence of other local ctors, these factors play a subordinate role in determining the variability in the blossoming the partial collectives while the weather is the principle influencing factor. No station ways reporting annually an early or late beginning of blossoming was found. The cartoraphic representation of isolines do not represent a real physical phenomenon. *Subject eadings:* **1. Phenological data 2. Statistical analysis of phenological data 3. Horse chestnut lossoming 4. Rhine-Main Valley, Germany.**—*I.L.D.*

10.4–114 551.506.8:634.23(521)

Karasawa, T., **On the forecast of flowering and full-bloom dates of cherry blossoms at suruga City.** *Japan. Meteorological Agency, Tokyo, Memoirs of Industrial Meteorology*, 1(1):23–27, **1957.** 2 figs., table, 4 refs., 11 eqs. In Japanese; English summary p. 27. **LC**—In the present paper, the author investigates the forecast of flowering and full-bloom ates of cherry blossoms (*P. yedownsis*) at Tsuruga, Fukui Prefecture, and the main results re as follows: (1) There is an especially high correlation between the monthly mean air mperature for March and the dates of first flowering and full-bloom of cherry blossoms. ccordingly, the following experimental formula is obtained for the purpose of forecasting: $Y_1 = 56.27 - 3.167T_3$, $r = 0.853$, $n = 37$, $o = 2.36$; $Y_2 = 61.66 - 2.915T_3$, $r = 0.800$, $n = 37$, $o = 3.33$; here Y_1, Y_2 are the first flowering date and the full-bloom date, respectively; T_3 the monthly ean air temperature for March; r the correlation coefficient; n the number of data; and o the andard deviation around the regression line. (2) Even by such a simple formula for forecastg, the standard deviations are only two or three days. However, for the purpose of announcg the forecast at the beginning of March, T_3 can not be used practically, and we must use xpected value of T_3 by long-range forecasting, or by the following formula: $Y_1 = 42.15 - 1.756T_2$, $= -0.502$, $n = 37$, $o = 3.81$, where T_2 is the monthly mean air temperature for February. ut the results by these methods are not good, unfortunately. *Subject Headings:* **1. Cherry ossom forecasting 2. Tsuruga, Japan.**—*Author's abstract.*

INSTRUMENT CARRIERS

See: **Met. tower data** (Singer, Raynor), 10.4–12; **Soviet ice floe stations** (Burkhanov), 10.4–16; **Met. Res. Flight, Brit. Met. Off.** (Murgatroyd), 10.4–40; **Satellite TV obs. techniques** (Glaser), 10.4–74; **Satellite obs.** (Skuridin, Kurnosova), 10.4–75; **Soviet satellites,** 10.4–77; **Gliding weather, Mâtra Mts., Hungary** (Kasza), 10.4–81; **Air sampling by helicopter** (McQuain et al.), 10.4–150.

INSTRUMENTS

See also: **Atmos. elec. instruments** (Imianitov), 10.4–6; **Radiosonde-aircraft sounding comparisons** (Ludlam, Saunders), 10.4–111; **Soil thermometers & frost heaving** (Stelzer), 10.4–216; **Atmos. turbulence and air-borne gust recorders** (Notess), 10.4–229; bibliog., on **Sferics,** p. 588.

10.4–115 551.508

†Bellamy, John C. (*Cook Research Labs*), **Meteorological instruments.** *Meteorological Monographs* (American Meteorological Society), Boston, 3(12–20):44–72, July **1957.** 6 figs.,

bibliog. p. 71–72. **DWB, DLC**—"The purpose of this review is to state the most importan contemporary problems in meteorological observatories and to suggest and to evaluate method of attacking these problems." Only synoptic and climatological classes of instruments ar considered in detail; physical and laboratory instruments are considered only so far as the appear likely to be used in synoptic or climatological operations. After reviewing the quanti tative and qualitative aspects of observational requirements and the needs of data processin as stated in the **Compendium of Meteorology,** the author discusses the following: recen developments of observational requirements with special reference to the aircraft industry nuclear energy (fall out, diffusion observations, etc.) and television; requirements for (1 observations that are continuous in space and time; (2) for data processing operations and fo improved record forms; and the instrumentation and processes meeting these needs, namely automatic recorders and readers, continuous data processing, cooperative observatories cooperative transport aircraft observations, cooperative airport observations, cooperative shi observations, cooperative satellite observations, cooperative commercial and agricultura observations, climate sensing, unattended weather stations, constant level balloons, and para sites (radiosondes, dropsondes or rocketsondes). *Subject Headings:* **1. Meteorological in struments 2. Applied meteorology.**—*I.L.D.*

10.4–116 551.508:620.1

Cammarata, John, (*Amer. Bosch Arma Corp., N. Y.*), **Review of environment tes equipment.** *Electrical Manufacturing*, N. Y., 59(5):127–131, 378, May **1957.** 4 table **DLC**—Environmental test equipment can be generally classified into two types: atmospheri (for producing or simulating high or low temperature, altitude, humidity, salt sea atmosphere fungus, rain, sunshine and radio interference) and mechanical (shock, vibration, acceleration etc.). Performance characteristics required of such equipment are discussed. Manufacturer of environmental test equipment in the U. S. and their products (in general terms) are listed *Subject Headings:* **1. Meteorological testing equipment 2. Test chambers.**—*G.T.*

10.4–117 551.508:551.58

Glaser, Arnold H.; Elliott, William P. and Druce, Albert J., **Study of small scale modifica tion of air passing over inhomogeneous surfaces.** Texas. Agricultural and Mechanica College. Dept. of Oceanography and Meteorology, Contract AF 19(604)-997, Final Report Jan. **1957.** 36 p. figs., tables, 6 refs., eqs. **DWB**—The 6 chapters of this report cover I. Mathematical theory of the internal boundary layer, II. An empirical treatment of the atmospheric internal boundary layer, III. The rotating arm temperature gradient instrumen recording on an oscillograph, IV. A relation between short period variations of wind spee and temperature gradient, V. Suggestions for further research, VI. Abstracts and scientifi reports and papers read at society meetings. Extensive mathematical derivations are given diagrams and photographs show details of equipment design and performance, data are give in tables and graphs and conclusion reached that the height of the momentum boundary laye is independent of wind speed, and the height of the thermal boundary layer is independen of speed and temperature difference (a 7/9 power law was found). *Subject Headings:* **1. Micro climatological observations 2. Microclimatological instruments 3. Rotating arm temperatur gradient instruments.**—*M.R.*

10.4–118 551.508:581.5

Ruge, U., **Eine neue pflanzenphysiologische Klimakammer.** [A new climatic chambe for plant physiology.] *Umschau*, 54(2):43–45, Jan. 15, **1954.** 5 figs. **DWB**—At the Botani Institute, Hannover, an illuminated chamber has been built for culture research, 4.1×2.3 m to maintain uniform conditions between 5–45°C and R.H. 40–95%. Construction an ventilation shown. *Subject Heading:* **1. Climatic chambers.**—*C.E.P.B.*

10.4–119 551.508.2:551.510.

Keller, H., **Surveillance et contrôle du rayonnement radioactif.** [Monitoring and contro of radioactive radiation.] *Technique suisse*, Lausanne, No. 2:52–54, Feb. **1958.** 6 figs.— Description of various types of instruments for detecting and controlling radioactive radiation *Subject Heading:* **1. Radioactivity measurement techniques.**—*A.V.*

10.4–120 551.508.25:551.521.64

Green, John R. (*Univ. of New Mexico, Albuquerque*), **Large scintillator for observation of smic rays.** *Review of Scientific Instruments*, Lancaster, Pa., 29(1):10–14, Jan. **1958.** 6 figs., oot-refs. **DWB, DLC**—A liquid scintillator having an area of five square meters has been veloped for the observation of the extensive air showers in cosmic rays. The scintillating uid, in the form of a disk 10 ft in diameter and 6 in. deep, is viewed by a single 14-in. Dumont pe K1328 photomultiplier tube. The associated circuitry provides a gate whose length is pportional to the logarithm of the scintillator pulse height over a range in pulse height of 00:1. The length of this gate can be either measured and recorded on a Berkeley EPUT ning meter or converted linearly to a pulse height and analyzed by a multichannel dis- minator. *Subject Heading:* **1. Cosmic ray scintillators.**—*Author's abstract.*

10.4–121 551.508.26:551.508.71

Nishiuchi, H. (*College of Agric. Univ. of Osaka Prefecture*), **Trial manufactures of a maxi- um-minimum thermometer and a maximum-minimum thermohygrometer.** *Journal of gricultural Meteorology*, Tokyo, 12(3):113–114, Jan. **1957.** fig. In Japanese; English mmary p. 114. **DWB**—A maximum-minimum thermometer, called *N type one* by the thor, which can measure at a distance the maximum and minimum temperatures in soils, wder, water, solutions, boxes, chambers, etc., was developed by improving the Six's maxi- um-minimum thermometer and was manufactured for trial. Also the diurnal maximum and nimum humidities can be measured by using a pair of these thermometers, one of which used as a wet bulb thermometer. *Subject Headings:* **1. Maximum-minimum thermometers Maximum-minimum thermohygrometers.**—*Author's abstract.*

10.4–122 551.508.29:551.508.822

Badgley, Franklin I. (*Univ. of Washington, Seattle*), **Response of radiosonde thermistors.** *e Review of Scientific Instruments*, N. Y., 28(12):1079–1084, Dec. **1957.** 3 figs., 3 tables, foot-refs., 4 eqs. **DLC**—The lag coefficient of a thermometer of cylindrical shape is shown be approximately proportional to the one-half power of its diameter and inversely pro- rtional to the one-half power of the product of ventilation speed and density of the environ- ental air. This leads to estimated lag coefficients on the order of twenty-five seconds for diosonde thermistors near their useful ceiling, which, in turn, implies that radiation errors one to several degrees may be expected in radiosonde temperature measurements at high itudes. *Subject Heading:* **1. Radiosonde thermistors.**—*Author's abstract.*

10.4–123 551.508.29:551.584

Goll, György, **Termisztorral működő villamos távhőmérő meteorológiai mérésekre.** [An ctrical distant thermistor thermometer for meteorological measurement.] *Időjárás*, udapest, 61(3):172–177, May/June **1957.** 4 figs. (incl. photos). French summary p. 172. rman version p. 230–233. **DLC**—A simple electrical thermometer with several points of easurement has been designed for micrometeorological research. By means of a thermistor, mperature readings are obtained with an accuracy sufficient for meteorological purposes. tails of construction and calibration of the instrument are described and illustrated. *Subject adings:* **1. Thermistor thermometers 2. Micrometeorological instruments.** –*G.T. Trans. author's abstract.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Dynamic met.** (Eliassen, Kleinschmidt), 10.4–19; **Hydrology forecasting seminars, Yugoslavia** (Ashford), 10.4–29; **Min. temp. freq., Arctic** (Lackey), 10.4–32; **100 years of Buys-Ballot law** (Affronti), 10.4–57; **Hist. of met. net-works, Florence,** (Bilancini), 10.4–58; **Weather and probability forecasting** (Malone), 10.4–96; **Cyclones, Texas, 1958** (Martin, Bucci), 10.4–189; **Trough & ridge freq., N. Hemisphere** (Klein, Winston), 10.4–191; **Cyclone microseisms, Atlantic** (Iyer), 10.4–194; **Atmos. oscillations** (Rocard), 10.4–223; **Mean press. charts, S. Hemisphere** (van Loon), 10.4–224.

10.4–124 551.509:551.513.1

Koo, Chen-chao (*Inst. of Geophysics and Met., Academia Sinica*), **On the equivalency of mulations of weather forecasting as an initial value problem and as an "evolution" problem.**

Acta Meteorologica Sinica, Peking, 29(2):93–98, May **1958.** 4 figs., 11 refs., 7 eqs. In Chinese English summary p. 98. **DWB**—Weather forecasting is formulated as an initial value proble in the work of numerical forecasting, while the routine forecasting in the conventional way formulated as 'evolution' problem of weather process, especially that on certain specific leve It is shown in this paper that for large-scale motion these two different formulations are in fac equivalent under certain trivial conditions. It is also pointed out that, for large-scale motio the three-dimensional structure of the baroclinic atmosphere at certain moments is reflecte in, and could be reconstructed from, the evolution of the contour and temperature fields a certain levels before and after that moment. *Subject Headings:* **1. Weather forecastin 2. Large scale weather processes.**—*Author's abstract.*

10.4–125 551.509:551.507.362.

Widger, William K., Jr. and Touart, C. N. (*both, A. F. Camb. Res. Center*), **Utilization o satellite observations in weather analysis and forecasting.** *American Meteorological Societ Bulletin*, 38(9):521–533, Nov. **1957.** 8 figs., 19 refs. **DWB, DLC**—The authors discuss th possible application of satellite data to weather analysis and forecasting within the reasonabl foreseeable future. The usefulness of satellites depends upon their orbital altitudes and i limited by the fact that they are outside the atmosphere being observed. The meteorologica observations are visual (clouds, cloud movements, drift of atmospheric pollutants, state o sea surface, visibility and snow cover); radiometric (albedo, temperature of a level near it c near the tropopause, total moisture content, total ozone content and surface or ground-ai interface, temperature), and radar observations. Data transmission and data processing, an the manner in which the information is provided by satellites in weather analysis and forecast ing are discussed. The possible information relevant to weather analysis that can be provide by cloud data (types, movement, etc.), surface wind data, tropopause temperature, etc. i summarized. A simplified and idealized example illustrating a weather analysis based upo satellite data is presented. Finally, the authors discuss a program for simulating data ob tained from satellites by means of rockets and aircraft flights, and utilizing such simulate data for forecasts, and appraise the value of satellite data in practical meteorology. *Subje Headings:* **1. Satellite data 2. Weather analysis 3. Weather forecasting.**—*I.L.D.*

10.4–126 551.509.1:621.395:519.2

Suzuki, E., **On the weather service by telephone and operations researches.** *Journal o Meteorological Research*, Tokyo, 10(3):185–197, March **1958.** 4 figs., table, 9 refs., 6 eqs In Japanese; English summary p. 185. **DWB, DLC**—The weather service by telephone starte Sept. 15, 1954. A more effective use will probably be achieved by the application of extende traffic and process theory and operations researches. In this paper, the author tried to analyz statistically and calculate several numerical examples for the following problems: 1) the mos efficient method for increasing the telephone circuit; 2) statistical adjustment problem of th telephone circuit, in case of number of calls varying with time. As a result, we can get th ordinary fact that 400 C.C.T. (which is used in telephonic weather service today) is considere to be sufficiently suitable from various standpoints, and the number of network circuits is to b proportionally varied with the diurnal variation of call number by telephone. *Subject Head ings:* **1. Telephonic weather forecasts 2. Operations Research.**—*Author's abstract.*

10.4–127 551.509.

Wan, P. K., **The processing and use of U. S. facsimile charts, Pt. 1.** *Meteorologica Bulletin*, Taipei, Formosa, 3(2):19–24, June **1957.** In Chinese; English summary p. 19 Also: **Pt. 2,** *Ibid.*, 3(3):10–17, Sept. **1957.** 2 refs. In Chinese. **DLC** (Orientalia)—Thi paper is presented to show the utilization and the capabilities of the facsimile charts. Afte describing the operation of the U. S. facsimile network briefly, the processing and use of th various facsimile charts are given. Their drawbacks and recent developments are also men tioned. *Subject Heading:* **1. Facsimile map utilization.**—*Author's abstract.*

10.4–128 551.509.2:621.397.

Galloway, J. L., **TV weather forecasts.** *Weather*, London, 12(12):392, Dec. **1957. DWB DLC**—Weather forecasts are broadcast by radio every half hour all day at Montreal, and a

00 p.m. daily there is a tabloid TV presentation of weather forecasts by staff members of the nadian Met. Service. The success of PERCY SALTZMAN'S presentation is said to be more at of techniques and personality than of the accuracy of the forecasts. He covers rapidly e highlights of weather over all of Canada and the U. S. so people will know how the weather where their relatives or friends are living or on vacation. Details of local weather should be t for frequent radio or telephone communication. Author suggests that the British Broadsts could well cover all of Europe in the same fashion. *Subject Headings:* **1. Television eather broadcasts 2. Montreal, Canada.**—*M.R.*

10.4–129 551.509.616/7

Mason, B. J. (*Imperial Coll. of Sci. & Tech., Univ. London*), **Meteorology.** (In: Bates, . R. (*ed.*), **The Earth and its atmosphere.** N. Y., Basic Books, **1957,** p. 174–203. 4 figs.) **LC**—Forecasting by synoptic methods, methods of synoptic analysis, development of weather stems, conventional and machine prediction techniques, future developments in forecasting; d the basic principles of cloud physics and rain making are treated in a popular style with fficient schematic and illustrative synoptic material to allow easy visualization of the problem. *ubject Headings:* **1. Synoptic meteorology 2. Cloud physics 3. Artificial precipitation.**—*M.R.*

10.4–130 551.509.22

Availability of 5 day mean 700 mb. charts for a 10 year period. *Monthly Weather Review,* Vashington, D. C., 86(3):107–108, March **1958.** fig. **DWB, DLC**—A brief note regarding series of 1040, 5-day mean 700 mb charts of the Northern Hemisphere for June 1945–May 955, with anomalies superimposed on 700 mb height contours and individual anomalies otted for each 5° intersection of lat. and long. Contours are drawn for 200 ft intervals and epartures from normal for 100 ft intervals. The set is available on microfilm (2 reels) for 3.00 from U. S. W. B. in Washington, D. C. *Subject Headings:* **1. 700 mb Northern Hemihere mean 5-day charts 2. Northern Hemisphere charts 3. Northern Hemisphere.**—*M.R.*

10.4–131 551.509.22:551.513.1

Ozawa, T. and Tomatsu, K. (*both, Met. Res. Inst.*), **Application of momentum-transport eory for 5-day mean chart.** *Papers in Meteorology and Geophysics,* Tokyo, 7(2):90–98, ily **1956.** 4 figs., 5 tables, 17 refs., 4 eqs. **DWB**—The statistical method for extended recasting is considered to have the two aspects of the climatological-statistical study and the rification of the various theories for the general circulation. In the following study, the lationship between the accumulation of angular momentum and the tendency of the zonal ind change for 5-day mean chart is statistically verified. Its relationship is statistically gnificant in high and middle latitudes. The study suggests that the momentum flow may be useful quantity for forecasting the zonal windspeed for the 5-day mean chart. As a preminary report on the climatological, statistical study for the general circulation, the spectral stributions of the wave number of the height along the latitudes are discussed. *Subject eadings:* **1. Momentum transport 2. Extended forecasting 3. Zonal wind forecasts 4. Stastical studies.**—*Authors' abstract.*

10.4–132 551.509.25:551.509.33

Kletter, L., **Ergebnisse einer Versuchsreihe mit vorausberechneten Höhenkarten über ittelfristige Zeiträume.** [Results of a series of experiments with height charts calculated in dvance on medium length periods.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, er. A,* Vienna, 10(2/3):144–160, **1958.** 5 figs., table, 5 refs., 6 eqs. In German; English and rench summaries p. 144–145. **DWB, DLC**—NAMIAS' formula for computing the mean pography at the 700 mb level for the period (−2) to (+3) and for a given point of the recast area

$$H=\tfrac{1}{10}(h_{-2^p}+h_{-1^a}+h_{-1^p}+h_{0a}+4h_{0p}+2N)$$

as modified in the following manner: a transition was made from the 700 mb to the 850 mb vel; the equation was split into an actual part that contains measured values $H=\frac{1}{5}(h_{-2^p}+h_{-1^a}+h_{-1^p}+h_{0a}+h_{0p})$ and into a forecast part $H=\frac{1}{5}(3h_{0p}+2N)$; the original forecast equation as extended, $H''=7(m+4V+2N)$ and medium range charts were computed by selecting a

two day time interval so that the tendency represents the difference between two 5-day mean With the aid of these equations, the author constructed a series of mean forecast maps as basis for extended weather forecasts four days in advance for an area embracing Europe a the North Atlantic. Four examples of such forecasts for the period July 1956–Feb. 1957 a presented and analyzed. For the 48h and the 72h forecast maps, skill correlations of 0.8 and 0.841, respectively, were obtained. *Subject Headings:* **1. Extended forecasting 2. Euro 3. North Atlantic.**—*I.L.D.*

10.4–133 551.509.25:551.542.1:551.5

Kochanski, Adam (*Headquarters, Air Weather Service*), **Ageostrophic deviations and wi prognoses.** *Journal of Meteorology*, 15(1):84–90, Feb. **1958.** 8 figs., 8 tables, 10 refs. **DW DLC**—This paper examines apparent ageostrophic deviations at 300 and 200 mb over the U. their relationship to upper air synoptic patterns, and the extent to which ageostrophic devi tions affect wind forecasts made from geostrophic maps. For spot winds, ageostrophic RM vector deviations are 19 kn at 300 mb and 20 kn at 200 mb. For the same set of data, ge strophic wind forecasts (36 hr) result in a 34-kn RMS vector error if verified by the geostroph winds, and 38 kn RMS error if verified by the rawins. Prognostic errors of route win decrease as the route length increases: for a route length 1900 n mi, the 36-hr geostrophic wi forecast gives RMS vector error 17 kn, if verified by geostrophic wind, and 19 kn if verifi by the rawins. Instrumental uncertainties inherent in the present upper wind reports preve the use of the rawins as an absolute standard for verification. In all, it appears that a mediu period forecast of spot and route winds can be made with tolerable approximation from t geostrophic prognostic charts. *Subject Headings:* **1. Ageostrophic wind variations 2. Ge strophic prognostic charts 3. United States.**—*Author's abstract.*

10.4–134 551.509.25:551.515

§Vore, C. W. and McCarter, R. M. (*both, Natl. Weather Analysis Center, U. S. W. B Wash., D. C.*), **Prognostic problems associated with cutoff Nevada lows, as illustrated by t case of Oct. 23–24, 1956.** *Monthly Weather Review*, Wash., D. C., 84(10):371–377, Oct. 195 4+ figs., 4 refs. **DWB, DLC**—A series of surface 500 mb and 200 mb charts for Oct. 23–2 1956, and the corresponding WBAN Analysis Center and JNWP prognostic charts show t explosive development and slow southeastward movement of a cutoff low in the Great Bas during that period, and the relation of forecast to observed patterns. The text goes in detail regarding the processes involved, the subjective prognosis, the chain reactions dow stream, verification and the special weather phenomena (precip., dust storms, snow, cold wav and frost) accompanying the development. The subjective forecast seemed to be mo accurate than the numerical or objective, though both had deficiencies. *Subject Heading* **1. Cut-off lows 2. Great Basin, U. S.**—*M.R.*

10.4–135 551.509

Lund, Iver A. and Wahl, Eberhard W., **Objective system for preparing operation weather forecasts.** *U. S. Air Force. Cambridge Research Center, Air Force Surveys in Ge physics*, No. 75, Nov. **1955.** 40 p. 12 tables, eqs. **DWB, DLC**—The contingency metho reported on in a previous survey, is reviewed and its applicability to short range forecasti problems is discussed in detail. A method for determining the best predictors to be used wi this system is presented. An actual forecasting problem is used to illustrate how the forecasti system is developed. Forecasts were made by this system, using independent data; th are compared with those made by various other techniques. *Subject Headings:* **1. Statistic forecasting 2. Contingency tables 3. Short range forecasting.**—*Authors' abstract.*

10.4–136 551.509.3:551.555

§Pan, Jün-Fang and Kao, Yu-Hsi, **On the study of the activities of the Polar high by usi advective-dynamic theory.** *Acta Meteorologica Sinica*, Peking, 26(1/2):89–108, **1955.** figs., 12 refs. In Chinese; English summary p. 108. **DLC** (Orientalia)—An advectiv dynamic and synoptic study of several "cold waves" or outbreaks of polar continental over China during spring. The structure of the fields of pressure/temperature are analyz and discussed in various stages of formation, development and outbreak. One case of

rmal (ultra-polar) outbreak and one of an abnormal type are used as examples. *Subject adings:* **1. Synoptic case history studies 2. Synoptic meteorology 3. Cold waves 4. China Eurasia 6. Far East.**—*Based on authors' abstract (M.R.)*

10.4–137 551.509.3:551.577.37(521.23)

Seshimo, Y. and Aoki, K., **On the local heavy rainfall on August 6–7, 1957.** *Journal of teorological Research,* Tokyo, 10(3):222–230, March **1958.** 15 figs., table, 6 refs. In panese; English summary p. 222. **DWB, DLC** —In this paper, the authors analyzed the al heavy rainfall that occurred from the evening on Aug. 6, 1957 to early dawn of the next y over the northern and central parts of Tochigi Prefecture. Principal results were as lows: The heavy rainfall occurred near a warm-front type occlusion associated with a ugh moving through the Prefecture, by the exchange of the upper dry air and moist warm stream at the lower level. The front meandered due to the influence of friction and the rthwestern mountain region. Radar echoes were found to be closely related to the movement rainfall-group. *Subject Headings:* **1. Synoptic studies 2. Synoptic conditions for heavy nfall 3. Tochigi Prefecture, Japan.**—*Authors' abstract.*

10.4–138 551.509.31:551.509.5

§Bachurina, A. A., **Razbor neudachnogo prognoza pogody na 31/V 1954 g.** [Analysis of unsuccessful weather forecast for May 31, 1954.] *Moscow. Tsentral'nyĭ Institut Prog-zov, Trudy,* No. 52:9–14, **1957.** 6 figs. **DLC**—The weather forecast for May 31, 1954 was udiness with light rain, weak and moderate northwesterly wind at night, moderate northerly nd during the day; low temperature both at night and during the day. The synoptic situation derlying this forecast was based on a high pressure ridge extending over the central regions European Russia, from the Baltic Sea to the Central Urals and Western Siberia, and disin-grating as a result of advective heat in the interior of a cyclone moving from Spitsbergen to E. of the Barents Sea. Cyclogenesis north of central European Russia was accompanied by nfall, not only in the center of the cyclone, but also in its trough westward. In making up e forecast that the cold front would move from the north, it was found that the principal asons for the failure of the forecast included the following: 1) A pressure ridge of high pressure tead of a trough was established over Central European Russia. 2) The expected nospheric flow from the north failed to materialize; instead it was from Lake Ladoga. On the night of May 31st, there was no rainfall in Central European Russia; this resulted m the curvature of the isobars from cyclonicity to anticyclonicity. Synoptic maps nstructed by the hydrodynamic method showed the same deviation from the actual situation did the forecast made by the forecaster. *Subject Headings:* **1. Weather forecasting Synoptic analysis 3. Forecast errors 4. Pressure fields 5. U.S.S.R.** —*I.L.D.*

10.4–139 551.509.31:551.509.5:551.577.11

Bachurina, A. A., **Razbor neudachnogo prognoza pogody na 26/VI 1954 g.** [Analysis an unsuccessful weather forecast for June 26, 1954.] *Moscow. Tsentral'nyĭ Institut ognozov, Trudy,* No. 52:40–46, **1957.** 6 figs., 2 tables. **DLC**—The failure of the forecast June 26, 1954 which predicted night temperature of 14–16° and day temperature of 22–27°C d no rainfall was the result of a failure to take into account those factors involved in rainfall mation. In preparing the forecast, the movement of the rainfall zone from the Lvov strict to the northeast was not considered; instead, a southward movement was counted on. The preparation of the forecast omitted the nature of the expected vertical motions, from the pressure field the forecaster predicted descending motion so that an indifferent atification of the atmosphere was expected. Calculation of vertical motions, resulting from tability and friction, indicated considerable downward movement on the morning and evening June 26, respectively. But, since the upward motion caused by these factors is small the cipitation must be attributed to convection. With the aid of aerological diagrams, the thor discusses the causes of precipitation at Moscow and L'vov and Smolensk. *Subject adings:* **1. Forecast errors 2. Rainfall 3. Convective rainfall 4. Synoptic analysis Moscow, U.S.S.R. 6. Lvov, Ukraine SSR.**—*I.L.D.*

WEATHER CONTROL

10.4–140 551.509.6:551.541:623.4

Yamamoto, R. (*Met. Res. Inst., Kyoto Univ., Kyoto*), **A dynamical theory of the micr barographic oscillations produced by the explosions of hydrogen bombs.** *Meteorologic Society of Japan, Tokyo, Journal, Ser.* 2, 35(5):288–296, Oct. **1957.** 7 figs., 5 tables, 8 re 6 eqs. **DWB, DLC**—A simplified theory of the external gravity waves in compressible flu is presented, and some dynamical tools which are useful for analysis of the recorded micr barographic oscillations due to the hydrogen bomb explosions are obtained. A theoretic contradiction of nonexistence of the waves with periods shorter than ca. 1.5 min, which aris when the two-layer model is adopted, is resolved by introducing the warm ozonosphere as t uppermost layer of four-layer model. *Subject Headings:* **1. Microbarograph oscillatio 2. Thermonuclear explosion effects on atmospheric pressure.**—*Author's abstract.*

10.4–141 551.509.

Aujeszky, László, **Az időjárás mesterséges befolyásolásának új lehetőségei.** [Ne possibilities of artificial weather modification.] *Időjárás*, Budapest, 55 (5/6):125–130, Ma June **1951. DLC**—Among the new techniques of weather modification, the author discuss artificial stimulation of rainfall by cloud seeding, lightning prevention by seeding thunde clouds with ammonia or nucleating agents, hail prevention and fog dissipation by overseedin and, finally, the Davidov project involving diversion of the Ob and Yenisei Rivers. *Subj Heading:* **1. Weather modification.**—*G.T.*

10.4–142 551.509.615:551.5

Bashkirova, G. M. and Krasikov, P. N., **Opyty po izucheniiu nekotorykh veshchestv kachestve reagentov kristallizatsii pereokhlazhdennogo tumana.** [Experiments with certa substances as crystallization agents for supercooled fog.] *Leningrad. Glavnaia Geofizicheska Observatoriia, Trudy*, 72:118–126, **1957.** 7 figs., 7 tables, 7 refs. **DLC**—The methods a results of such experiments carried out in a 250-liter refrigerating chamber, with the followi substances—cadmium oxide, zinc oxide, silver iodide, iron sulfide, fluoroglycine, silver dioxid gasoline tank deposits, and magnesium oxide—are described and discussed. It is shown th silver iodide is the most effective of all agents. Properties of the other agents mentioned a also presented. Photos of ice crystals formed at the introduction of these various agents in fog are included. *Subject Headings:* **1. Artificial fog 2. Nuclei sources 3. Silver iodi effectiveness.**—*A.M.P.*

10.4–143 551.509.616/7:551.515.4:551.578

§Chuvaev, A. P., **O sovremennykh vozmozhnostiakh predotvrashcheniia groz i grad** [Present possibilities of thunderstorm and hail suppression.] *Leningrad. Glavnaia Geofi cheskaia Observatoriia, Trudy*, No. 74:71–102, **1957.** 23 figs., 39 refs. **DWB** (M(055) U581t —A number of experiments carried out during July 1954 and June 1956 in the U.S.S.R. order to suppress the development of large cumuli-nimbus clouds immediately in the vicini of a front or close to it, and to prevent the formation of thunderstorms, are described a analyzed. The experiments were made in Krasnoarmeĭskoe District (Stalino-Khark route), the Oposhnaya District, Nezhin-Kozelets-Konotop District, and the Bol'shoĭ-Vradnev District. Synoptic maps showing the state of the weather during the seeding with dry i from airplanes, and photographs of clouds before and after seeding, are presented. Seedi of large anvil-shaped cumulus clouds are followed after a few minutes by freezing of the to of the seeded clouds and by rapid subsidence. From the bottom of the cloud, precipitati began to fall over a considerable area. At the same time the unseeded clouds were still i creasing in size. The potential gradient of the electric field varied in various experiments fr 2 to 50 v/cm. A review of the literature on cloud seeding designed to suppress hail and thund storms is presented. *Subject Headings:* **1. Cloud seeding 2. Hail suppression 3. Thunde storm suppression 4. U.S.S.R.**—*I.L.D.*

10.4–144 551.509.616:551.574.2(67

Dessens, Henri and Dessens, Jean (*Puy de Dôme Obs.*), **Etude préliminaire des cumul et des pluies obtenus par convection provoquée.** [Preliminary study of cumulus clouds a precipitation obtained by artificially induced convection.] *Puy de Dôme. Observatoi*

ılletin, n.s., No. 2:47–60, April/June **1957.** 3 figs., 16 refs. English summary p. 47. **DWB** The artificial formation of cumulus clouds by means of large grass fires was further pursued Lukolela (Belg. Congo). Meteorological conditions which favor the formation of clouds forced convection and the formation of precipitation from such clouds are described and the ergies involved are estimated. The cumuli produced in the experiments described are ınd to be liable to yield precipitation because of the strong updrafts and horizontal eddies in em. Photographs of artificially produced cumuli are presented. *Subject Headings:* **1. Arti-ial cumulus clouds 2. Artificial convective cloud generation 3. Cloud seeding with fires Lukolela, Belgian Congo.**—*G.T.*

10.4–145 551.509.617

Berndt, Gerald D., **Evaluation of commercial cloud seeding operations conducted during e summer months in South Dakota.** (In: U. S. Advisory Committee on Weather Control, nal Report, 1957, pub. **1957.** 2:69–80. 5 figs., 9 tables, 16 refs., 13 eqs.) Reprinted from *S. Advisory Committee on Weather Control, Technical Report*, No. 5. **DW3, DLC**—The ıtistical methodology for evaluating the effect of summer time cloud seeding operations in uth Dakota upon the rainfall in this area is presented. The author discusses the suitability the rainfall data available for the target and control area, prior to the initiation of seeding erations, and the lack of physical evidence on the frequency of supercooled clouds over uth Dakota during the summer months, on the accuracy of "targeting" the seeding, on the tual penetration of AgI nuclei into the clouds, etc. The rainfall variable, which consists of e rainfall records of the five target stations for the summer months of 1926–1950 and 1951–54, analyzed for statistical independence and for trend, and the distribution of rainfall amounts found to be represented adequately by the gamma distribution. The possibility of determin-g whether rainfall has been increased by cloud seeding is analyzed by means of a fixed sample-ze test and by sequential analysis; and it is shown that for the number of storms seeded ither of these tests is sufficient to detect rather small but important increases in rainfall. o make use of the information available in the data of four years of seeding operations, a rm of decision theory using the Bayes procedure is used. "On the premise that some decision seed or not may be based upon the information of this evaluation, the idea of consequent erage loss, or risk, is discussed for various possible eventualities." The more usual test of gnificance is compared with the Bayes procedure and it is shown in an illustration that both ay lead to erroneous decisions and hence economic loss. The maximum risk over all possible eding effects is shown to be less for the Bayes procedure. Application of the Bayes procedure the seeded South Dakota storms gives preliminary indications that there is less risk in oosing to seed in May, June and Aug. but not July, than in taking the alternative course action in those months. *Subject Headings:* **1. Cloud seeding 2. Cloud seeding evaluation Bayes procedure 4. South Dakota.**—*I.L.D.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

DENSITY AND COMPOSITION OF THE ATMOSPHERE

See: **Alt. and air density effect on fans** (Rogers), 10.4–98.

ATMOSPHERIC POLLUTION

10.4–146 551.510.42:628.53

Danis, A. L. (*Univ. of Florida*), **Site selection and meteorological control.** *Florida Univ. ngineering and Industrial Experiment Station, Engineering Progress at the Univ. of Florida*, (9):33–38, Sept. **1957.** 7 figs. **DWB**—This article is more concerned with diffusion of ack gases than with industrial planning or plant design. Steps in obtaining data, studies of ıstable, weak, lapse, ground, or deep inversion conditions, the effect of slow moving cold ınts and, finally, the intensity and frequency of unallowable pollution conditions, are sug-sted and demonstrated by schematic cross-section diagrams of behavior of plumes under rying conditions. *Subject Headings:* **1. Industrial site planning 2. Stack meteorology.** *M.R.*

10.4–147 551.510.42:532.

Denisov, A. I., **O rasprostranenii pyli i gazov iz dymovykh trub.** [The diffusion of du and gases from smoke stacks.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 6:834–83 June **1957.** 3 figs., 7 refs., 11 eqs. **DLC.** Trans. into English available. **DWB** (M10. D396on)—The equations for the determination of the diffusion of dust or gas particles in t atmosphere of BOSANQUET and PEARSON are valid only for the concentration of weightle particles at the earth's surface. It is shown that by generalizing the equation of PEARSO and BOSANQUET for ponderable substances in the form

$$q/z=0=\frac{Q(1.78\,h/b_z)^{w/b_zu}}{\sqrt{2\pi b_y}\,b_z u x^{2+w/b_zu}}\exp\left(-h/b_z x-y^2/2b^2_y x^2\right)$$

it is possible to obtain a solution for ponderable particles. The equation obtained is:

$$q/z=0=Q\,\frac{h^{w/b_zu}\exp\left(-\dfrac{y^2}{2b^2_y x^2}-\dfrac{h}{b_z x}\right)}{\sqrt{2\pi}\,T\left(1+\dfrac{w}{b_zu}\right)b_y b_z^{1+w/b_zu}\,ux^{2+1w/b_zu}}$$

Theoretical calculations of maximum concentrations of particles are carried out and grap showing the values obtained are presented. *Subject Headings:* **1. Diffusion of stack effluen 2. Dust.**—*I.L.D.*

10.4–148 551.510.42:551.578.

Gorham, Eville (*Freshwater Biol. Assoc., Ambleside, Westmorland*), **Atmospheric pollutio by hydrochloric acid.** *Royal Meteorological Society, Quarterly Journal*, London, 84(361):27 276, July **1958.** fig., table, 7 refs. **DWB, DLC**—Precipitation samples from urban depos gages in Britain exhibit a distinct positive correlation between chloride and acidity in sampl of pH <5.7. The first order correlation coefficients for hydrogen ions and chloride in depos from Sheffield, and from Manchester and Salford, are shown to be highly significant, wh those for hydrogen ions and sulphate are not significant. It is therefore suggested th hydrochloric acid should be considered in assessing the causes of rain acidity in urban area *Subject Headings:* **1. Atmospheric pollution 2. Hydrochloric acid 3. Rainfall acidity 4. En land.**—*Author's abstract.*

10.4–149 551.510.42:551.556

*Holzworth, George C. and Blake, Dean, **Meteorological summaries of importance to a pollution in western San Diego County.** California Dept. of Public Health, Bureau of A Sanitation, Dec. 31, **1957.** 29 p. 46 figs., 15 tables, 20 refs. **DWB** (M10.42 C153me) This paper summarizes the characteristics of winds, atmospheric stability and cloudines It describes the manner in which such variables affect air pollution in San Diego Count Light winds and stable atmospheric conditions contribute to high concentrations of air po lutants. Sea breeze coincides with higher temperatures, and land breeze with lower tempera tures. In summer, marine air results from large scale pressure patterns. At night, valley a slope winds become reversed and very light. The general meteorological conditions here a those of Los Angeles are alike. *Subject Headings:* **1. Atmospheric pollution 2. Wind effects atmospheric pollution 3. San Diego County, Calif.**—*N.N.*

10.4–150 551.510.42:551.507.3

McQuain, R. H.; Leavitt, J. M.; Wanta, R. C. and Frisbie, W. W. (*all, U. S. Weath Bureau*), **Urban air sampling by helicopter: a progress report.** For presentation at the annu meeting, Air Pollution Control Association, Phil., Pa. U. S. Dept. of Health, Education a Welfare, Public Health Service (and) Robert A. Taft Sanitary Engineering Center, Cincinna Ohio, May 27, **1958.** 11 p. 16 figs., table, 4 refs. **DWB** (M10.42 U5863ur). Appeared *Air Pollution Control Association Proceedings*, Vol. 51, **1958.** *Paper*, No. 27 (24 p.) 16 fig table, 4 refs. **DWB** (M10.42 A298ap)—A method of measuring the concentration of oxidan in the vertical by using a helicopter is described. The helicopter can also be used to obta the vertical temperature structure over an urban area concurrent with pollution samplin

n addition an estimation of the visible pollutants over a city and surrounding area can be btained in a minimum of time. *Subject Headings:* **1. Air sampling by helicopter 2. Heli-opters.**—*Authors' abstract.*

STRUCTURE OF THE ATMOSPHERE—UPPER ATMOSPHERE—IONOSPHERE

See also: **Radiation effects,** 10.4–3; **Satellite obs.** (Skuridin, Kurnosova), 10.4–75; **Radiational cooling and ozone absorption** (Brooks), 10.4–212; **Eclipse effects on ionosphere** (Minnis), 10.4–300.

10.4–151 551.510.528:551.524.7

Kogan-Beletskiĭ, G. I., **K voprosu opredeleniia granits tropopauzy.** [Problem of determin-ıg the boundaries of the tropopause.] *Meteorologiia i Gidrologiia*, Leningrad, No. 12:36–39, **957.** 2 figs., 8 refs. **DWB, DLC**—Evidence from the literature is presented to contradict he statement of I. F. Kvaratskheliia (*Met. i Gid.*, No. 6, **1956,** *see* 9.6–142, June 1958, *MAB*) hat the beginning of the tropopause is the level of minimum temperature. Instead, the ropopause is a layer where the decrease of temperature with height gradually diminishes and n inversion or isothermy begins. The lower boundary of the tropopause is the beginning f the layer of upper disturbances of the troposphere where the vertical temperature falls, ess than in the troposphere. Further evidence on the boundaries of the tropopause is provided y studies of stable condensation trails. The most favorable conditions for the formation of ondensation trails were found to be in the upper part of the troposphere and in the layer of the urbulent troposphere below the characteristic surface (the level of minimum temperature in he tropopause). Above the latter, in the substratosphere, contrails rarely formed or rapidly isappeared. In the lower part of the tropopause the water vapor content is close to saturation. The distribution of moisture is fundamentally different between the upper and lower boundaries f the tropopause. The region of isothermy or inversion is above the characteristic surface nd is an intense retention layer, below which water vapor and diverse solid admixtures ccumulate. Observations are cited indicating that high relative humidity in the lower ropopause is associated with cirrus clouds. The determination of the boundaries of the ropopause when irregular advection of air masses occurs in atmosphere, the analysis of the xtent of the tropopause over large areas, and the determination of the tropopause for vertical ections or charts, etc. are discussed. *Subject Headings:* **1. Tropopause boundaries 2. Tropo-ause temperatures.**—*I.L.D.*

10.4–152 551.510.53:551.510.41:551.524

Craig, Richard A. and Ohring, George (*both, GRD, AF Camb. Res. Center, Mass.*), **The emperature dependence of ozone radiational heating rates in the vicinity of the mesopeak.** *ournal of Meteorology*, 15(1):59–62, **1958.** 9 figs., table, 5 refs., 5 eqs. **DWB, DLC**—Radia-ional heating of the mesosphere results principally from absorption of ultraviolet radiation y ozone. For conditions of photochemical equilibrium, the amount of ozone present near the esopeak depends critically on the temperature. Relatively high temperature results in less zone and less heating. Calculations presented herein show that this effect has a strong tabilizing influence on the temperature values near the mesopeak. *Subject Headings:* **1. Ultra-iolet absorption by ozone 2. Temperature-ozone amount relationships 3. Ozone radiational eating 4. Mesosphere.**—*Authors' abstract.*

10.4–153 551.510.535:536.2:546.11

Chapman, Sydney (*Geophysical Inst., College, Alaska and High Altitude Obs., Boulder, olo.*), **Speculations on the atomic hydrogen and the thermal economy of the upper ionosphere.** n: **The threshold of space,** ed. by M. Zelikoff. N. Y., Pergamon Press, **1957.** p. 65–72. ible, 18 refs., eqs.) **DLC**—The proportion of atomic hydrogen in the air above the mesopause discussed. Tentative estimates are made of the height at which neutral atomic hydrogen ecomes the major constituent of the air. The thermal conductivity K of the air is discussed: is shown that it probably increases upwards above the F2 peak. The author has recently ggested that the heat flux below the F2 peak may come mainly from the hot coronal gas in hich the earth is immersed. If this be so, the temperature will continue to increase upwards

above the F2 peak, until at 30,000°K or more the hydrogen becomes highly ionized. There especially in the equatorial plane, the geomagnetic field will greatly reduce the thermal con ductivity for radial heat flow. Heat can however, flow freely downwards from the coronal ga into high latitude air: thence it may be communicated horizontally to lower latitudes by th thermal conductivity of the neutral component of the air. Until the neutral atomic hydroge content of the air is experimentally determined at a level above that at which diffusive equilib rium begins, it seems unprofitable to make detailed calculations of K as a function of height an latitude for radial heat flow, or to work out a detailed scheme of the heat flow into the F layer from the extended solar corona. *Subject Headings:* **1. Atomic hydrogen 2. Therma conductivity of upper ionosphere.**—*Author's abstract.*

10.4–154 551.510.535:538.56:621.39

Försterling, Karl and Wüster, Hans-Otto, **Über die Entstehung von Oberwellen in de Ionosphäre.** [Generation of higher harmonics in the ionosphere.] *Journal of Atmospher and Terrestrial Physics*, 2(1):22–31, **1951.** 5 refs., eqs. English summary p. 22. **DWB**— It is shown, in continuation of earlier work on the propagation of plane electromagnetic wave in an inhomogeneous stratified medium, that the strength of the electric field parallel to th plane of incidence shows a singular point near a zero of the dielectric constant and, in th absence of damping, becomes infinite. Power series are developed for the case of a single nu point. With a double null point the singular points can be represented by known functions The singular points so determined give rise to higher harmonics which are not radiated by th transmitter. *Subject Heading:* **1. Radio wave propagation.**—*C.E.P.B.*

10.4–155 551.510.535(64

Haubert, A., **L'ionosphère à Casablanca.** [The ionosphere at Casablanca.] *Raba Morocco. Institut Scientifique Chérifien. Service de Physique du Globe et de Météorologi Annales*, 17:103–110, **1957.** 5 figs., 11 refs. **DLC**—Study of the E and F layers by means c soundings made at Casablanca during the period Sept. 1, 1953 to Aug. 31, 1955. The con tinuity and the pursuit of these soundings permit, temporarily at the very least, th quantitative determination of the influence of the solar activity on the E and F1 layers. Th author succeeds in classifying the various anomalies observed, and to associate them eithe with geophysical phenomena or with solar disturbances. *Subject Headings:* **1. Ionospheri soundings 2. Solar-ionospheric relationships 3. Casablanca, French Morocco.**—*A.V.*

10.4–156 551.510.535:621.396:523.7

Houston, R. E., Jr.; Ross, W. J. and Schmerling, E. R., **Some effects of intense sola activity on radio propagation.** *Journal of Atmospherics and Terrestrial Physics*, 10(3):136–139 March **1957.** 4 figs., 2 refs. **DWB**—Observations on 75 kc/s at vertical incidence at Iono sphere Research Lab. (Pa.) during solar flare of 0300 UT on 23 Feb. 1956 are reported. N significant change of group height was noted. Phase height showed a rapid decrease of 8 km beginning 2238±3 LMST and lasting an hour. A large increase of absorption occurred 1 min after visual observation of the solar event. *Subject Headings:* **1. Radio wave propagatio disturbances 2. Solar flares.**—*C.E.P.B.*

10.4–157 551.510.53

Ionescu, T. V., **Sur la diffusion des ondes électriques de très grande fréquence dan l'ionosphère.** [Ionospheric scattering of very high frequency electric waves.] *Académi des Sciences, Paris, Comptes Rendus*, 245(5):520–522, July 29, **1957.** 3 refs. **DLC**—Th author points out that the diffusion of very high frequency electric waves can be explaine through the negative molecular oxygen ions, which possess their own vibration periods and ar produced in great number at altitudes from 50 to 90 km. This theory concerning diffusion o electric waves in the ionosphere makes it possible to calculate the diffused power value. *Subje Headings:* **1. Electric wave diffusion 2. Diffusion in ionosphere.**—*A.V.*

10.4–158 551.510.535:551.55

Jones, I. L. (*Cavendish Lab., Cambridge*), **The height variation of drift in the E region** *Journal of Atmospheric and Terrestrial Physics*, London, 12(1):68–76, **1958.** 8 figs., table

refs. **DLC**—Observations of drift velocities in the E region of the ionosphere have been ıade simultaneously with waves of frequency about 2.0 and 2.5 Mc/s by means of the Mitra ıethod. Since the observed velocities were significantly different, it is deduced that the ıportant scattering occurs near the level of reflection, so that the observations on the two ·equencies provide information about the drift velocities at two different heights. The elocities rotated through 360° in the course of the daylight hours, and during the winter ıonths the rotation corresponding to reflection at the smaller height lagged behind that ɔrresponding to the greater. The rotation of the velocity was not uniform during the day, nd this non-uniformity is explained by considering how the height of reflection varies during ıe day. When the results were compared with those deduced from radio observation of ıeteor trails made by GREENHOW and NEUFELD (1956) it was found that the time lag between ıe rotating drifts observed by the two methods could be satisfactorily explained if proper ccount was taken of the different heights to which the observations refer. Rapid changes in ıe drifts were observed in Sept. and Oct. by both methods. *Subject Headings:* **1. Ionospheric rift variations with height 2. E region 3. Ionospheric drift measurements.**—*Author's bstract.*

10.4–159 551.510.535:551.524.7

Kallmann, H. Korf (*Univ. of California at L. A.*), **A new model of the atmosphere and ɔnosphere.** *Annales de Géophysique*, Paris, 14(2):140–143, April/June **1958.** 4 figs., 11 refs. **)LC**—A model giving the temperature distribution and electronic density with altitude up to 00 km is presented. The theoretical study of the ionosphere is still very complex since such greater number of uncertainties in the various physical quantities are involved, such as hoton emission from the solar atmosphere, air composition of the earth's atmosphere, true bsorption and recombination coefficients. *Subject Headings:* **1. Atmospheric models 2. Iono-pheric models 3. Solar atmosphere 4. Atmospheric composition.**—*A. V.*

10.4–160 551.510.535:621.396

King, J. W. (*Cavendish Lab., Cambridge*), **The fading of radio waves reflected at oblique ıcidence.** *Journal of Atmospheric and Terrestrial Physics*, London, 12(1):26–33, **1958.** figs., 5 tables, 18 refs. **DLC**—Previous experimental results on the reflection of radio waves ·om the ionosphere at near-vertical incidence have been extended to include the case of waves ıcident obliquely. It is shown that the radio diffraction pattern formed at the ground by a ıedium frequency wave reflected at oblique incidence is very much larger than expected and , on the average, roughly circular. It is concluded that the ionospheric irregularities re-ɔonsible for the fading have much greater extent in the horizontal than in the vertical plane. t is found, in general, that the speed of fading of a wave of frequency f is proportional to $f \cos i$, ·here i is the angle of incidence on the ionosphere, and that the probability distribution of mplitude tends to be log normal rather than of the type discussed by RICE (1947). *Subject Ieadings:* **1. Ionospheric radio wave reflection 2. Radio fading.**—*Author's abstract.*

10.4–161 551.510.535:551.510.62:538.566.3

Marcou, R. J. (*Boston College, Newton, Mass.*); Pfister, W. (*A. F. Cambridge Res. Center, ledford, Mass.*) and Ulwick, J. C. (*A. F. Cambridge Res. Center, Bedford, Mass.*), **Ray-tracing echniques in a horizontally stratified ionosphere using vector representations.** *Journal of eophysical Research*, Wash., D. C., 63(2):301–313, June **1958.** 2 figs., 9 refs., 54 eqs. **DLC**—ector expressions are derived for tracing oblique ray paths, taking into account the full effect f the earth's magnetic field. The method is an extended analytical treatment of POEVER-EIN's two dimensional case based upon crystal optics. In particular, the unit vector S in ıe direction of the ray and the vector expressions for the equivalent path of the wave packet nd the group refractive index are drived. A method for high speed computers is described ɔr ray tracing in a horizontally stratified ionosphere, for determining, by an iteration process, ıe index of refraction and wave normal direction, and for determining electron-density istributions from rocket data. *Subject Headings:* **1. Ray tracing techniques 2. Ionospheric ıdio wave propagation 3. Refractive index 4. Magnetic field effects.**—*Authors' abstract.*

RADIO PROPAGATION

See also: **Ionospheric radiowave propagation** (Marcou), 10.4–161.

10.4–162 538.56:551.510.6

Bolie, V. W. (*Iowa State College, Ames, Iowa*), **Electromagnetic propagation in an almost homogeneous medium.** *Australian Journal of Physics*, Melbourne, 11(1):118–125, March **1958.** 4 figs., 24 eqs. **DLC**—This paper concerns the development from MAXWELL's electromagnetic equations of an equation of propagation in an almost homogeneous medium. The equation is applied to the problem of determining the secondary wave produced by an isolated Gaussian-shaped perturbation in the refractive index.. An exact solution is obtained for points located on the axis of symmetry parallel to the direction of propagation of the incident primary wave. An approximate solution for points remote from the anomaly is obtained and its validity is compared with the more restricted exact solution. An interesting limit process is encountered in the derivation of the formula for the scattering cross section of the refractive index perturbation. *Subject Heading:* **1. Electromagnetic wave propagation.**—*Author's abstract.*

10.4–163 551.510.62:551.510.53

Dinger, H. E.; Garner, W. E.; Hamilton, D. H., Jr. and Teachman, A. E., **Investigation of long-distance overwater tropospheric propagation at 400 mc.** *Institute of Radio Engineers Proceedings*, 46(7):1401–1410, July **1958.** 15 figs., foot-refs. **DWB, DLC**—The results of an investigation of overwater tropospheric propagation under both summer (July, 1955) and winter (Feb., 1956) conditions are presented. Transmissions were from a point on the south shore of Massachusetts, near New Bedford, to a ship traveling along Great Circle courses to a maximum distance of 630 naut mi (724 statute mi) from the transmitter. A 10-kw, 385.5-mc transmitter feeding a 28-ft paraboloid antenna was used for the summer phase. For the winter investigation, this same facility was used, supplemented by a 40-kw transmitter feeding a 60-ft paraboloid for use at the greater distances. The frequency used for the winter was 412.85 mc. The receiving antenna aboard the ship was a 17-ft paraboloid for both series of tests. All antennas were horizontally polarized and approximately 100 ft above sea level. The data obtained are presented to show the median path loss vs. distance. The strip chart recordings of the received signal levels were analyzed with respect to fading characteristics in an effort to separate out those transmissions which were enhanced by super-refractive conditions. The fast fading signals, which were well-represented by the Rayleigh distribution, were assumed to be unaffected by superrefractive conditions. The data for the fast-fading Rayleigh type signals appear to show a cyclic variation of the attenuation rate with distance although there is no substantial deviation from a linear rate of between 0.16 and 0.18 db per nautical mile. *Subject Headings:* **1. Tropospheric radio wave propagation over water 2. Radio wave propagation 3. Radio fading.**—*Authors' abstract.*

10.4–164 551.510.62:621.396.1

Klinker, L., **Weitere Ergebnisse von troposphärischen Driftbeobachtungen zur Frage des Fernausbreitungsmechanismus im Meterwellenbereich.** [Further results on tropospheric drift observations on the subject of radio propagation mechanism in the meter wave range.. *Zeitschrift für Meteorologie*, Berlin, 11(10/11):339–344, Oct./Nov. **1957.** 5 figs., 3 tables, 5 refs. **DWB, DLC**—In order to investigate the propagation conditions in the ultrashort wave region 160 observations on tropospheric drift made with short waves were carried out at the Kühlungsborn Observatory. Of these observations, 130 could be compared with simultaneous aerological measurements at the Copenhagen-Castrup Station. The results of the study indicate that the partial reflections in the meter wave region constitute the exclusive propagation mechanism up to a distance of 500 km from the sender. Ultrashort wave propagation observations prove to be a good aid in continuous control by large geographic areas over the intensity of vertical transposition processes in the lower troposphere, in particular of the ground layer since the intensification or attenuation of strata inhomogeneities become immediately visible in the intensity of the reflected field. Specific examples of drift observations accompanied by aerological observations are presented. *Subject Headings:* **1. Tropospheric drift 2. Short wave radio propagation.**—*I.L.D.*

10.4–165 551.510.62

†Maenhout, A., **Troposferische voortplanting van drie metergolven in verschillende luchtmassas.** [Tropospheric propagation of 3-meter waves in different air masses.] *Vlaamsche Academie voor Wetenschappen, Letteren en Schoone Kunsten van België. Klasse der Wetenschappen, Mededeelingen*, 20(2), **1958.** 16 p. 4 figs., 6 tables, 12 refs. Dutch and English summaries p. 15–16.—The signal strength from F.M. radiotransmitters, with wave length of approximately 3 m, was measured at the Geophysical Centre at Dourbes (Belgium). We tried to find relationships between the received signals and the air mass. The experimental results can be summarized as follows: a high signal strength is found in maritime weather situations, in air of tropical origin and in continental weather situations, when subsiding maritime air lies above continental air. In polar maritime air and in frontal zones, signal strengths are weak. The signal strength in maritime air is higher than in polar maritime air but generally lower than in maritime tropical air. A correlation was found between the signal strength in these different air masses and the static stability of the air mass. *Subject Headings:* **1. Tropospheric propagation-air mass correlations 2. Dourbes, Belgium.**—*Author's abstract.*

RADIOACTIVITY

See also: **Radioactivity meas tech.** (Keller), 10.4–119; **Ion pair production** (Kawano), 10.4–311.

10.4–166 546.79:551.510.71

Jaki, Stanley L. and Hess, Victor F. (*both, Fordham Univ., New York*), **A study of the distribution of radon, thoron, and their decay products above and below the ground.** *Journal of Geophysical Research*, Wash., D. C., 63(2):373–390, June **1958.** 3 figs., 5 tables, 10 refs. **DLC**—The respective concentrations of radon, thoron, and their decay products have been measured immediately above the earth and below the ground, and a study of their correlation with meteorological conditions has been carried out. It was found that the concentration of radon and thoron in the vicinity of the earth's surface depends primarily on the dryness of the ground. Measurements at and below the ground level were carried out by an indirect method, collecting the decay products of radon and thoron on the inner surface of an aluminum cylinder charged to −600 volts. From Nov. 16, 1956 to May 7, 1957, 239 experiments were made. It was found that the concentration of thoron below the ground seems to reach a maximum value at a depth of about 75 cm, whereas the concentration of radon shows a continuous increase within the range investigated. Comparison with other experiments shows that the cylinder method can be used for investigating the exhalation of both radon and thoron at the surface of the ground. The mean value obtained for radon is 6×10^{-14} curie per cm² sec. The measurements presented here give the first data on the exhalation of thoron through the air-soil interface. *Subject Headings:* **1. Radon measurement 2. Isotope distribution 3. Radioactivity in the atmosphere.**—*Authors' abstract.*

10.4–167 551.510.721

Rafter, T. A. and Fergusson, G. J. (*both, Dept. of Sci. & Ind. Res., New Zealand*), **Recent increase in the ^{14}C content of the atmosphere, biosphere, and surface waters of the oceans.** *New Zealand Journal of Science and Technology, Section B*, 38(8):871–883, Sept. **1957.** fig., 11 refs., 4 tables, 3 eqs. **DLC, DGS**—Recent measurements of the C^{14} specific activity of the atmosphere of the Southern Hemisphere show that the C^{14} specific activity has been increasing at an approximately exponential rate since late 1954. The total increase by May, 1957, was $6.70\pm0.30\%$. The C^{14} specific activity of the contemporary portion of the biosphere has been shown to be increasing at the same rate. The only feasible explanation for this increase in C^{14} specific activity is the production of C^{14} from the testing of atomic weapons. An increase of $2.0\pm0.5\%$ in the C^{14} specific activity of the surface water of the ocean was observed by May, 1957. An exchange time of 20 months for the transfer of carbon dioxide from the atmosphere to the surface water of the ocean has been deduced from the above measurements. (For condensed version, *see* 9C–126, March 1958, *MAB.*) *Subject Headings:* **1. Carbon-14 variations 2. Radioactive contamination of atmosphere 3. Carbon dioxide exchange ocean-atmosphere.**—*Authors' abstract.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Forced convection and stability effects on fires** (Scesa), 10.4–11; **Dynamic met.** (Eliassen, Kleinschmidt), 10.4–19; **Gen. circulation and rotating fluid exp.** (Kuo), 10.4–179; **Moisture exchange and vertical current effects** (Arrago), 10.4–248; **Monsoon precipitation, North Pacific O.** (Ogata, Itakura), 10.4–273.

10.4–168 551.511.2/32

Hollmann, G. (*Deutscher Wetterdienst, Offenbach*), **Die Krümmungs und die Scherungs-Vorticitygleichung: die Richtungs- und die Geschwindigkeits-Divergenzgleichung.** [The curvature- and the shearing-vorticity equation: the direction- and the speed-divergence equation.] *Beiträge zur Physik der Atmosphäre*, Frankfurt a.M., 30(4):254–267, **1958.** 4 refs., 84 eqs. German, English and French summaries p. 254–255. **DLC.** Trans. into English issued as: Germany. Deutscher Wetterdienst, Contract AF 61(514)-735C, Technical Note, No. 6, **1958?** 17 p. 4 refs., 84 eqs. **DWB** (M09.312 G373r)—It is known, that, with the aid of natural coordinates, the vertical component of vorticity of the wind velocity can be split up into curvature and shearing-vorticity and the divergence of the horizontal wind into direction-and speed-divergence. Until now, only equations for the total vorticity and divergence are known: The vorticity- and divergence equations. In this paper corresponding equations are derived for all four quantities, viz. curvature vorticity, shearing vorticity, direction divergence and speed divergence. They will permit a deeper insight in the dynamics of the vortex and divergence motions. These four equations give information about the terms which contribute to the time variations of the four quantities under consideration, showing, particularly clearly, the influence of the vertical motion. Moreover, the new equations contain transformation functions which describe the transformation of one vorticity form and of one divergence form into the other. The transformation terms are independent from the vertical structure of the atmosphere and therefore also effective in a barotropic atmosphere. A number of important theorems are derived. Thus, it is found that vertical variations of the wind speed produce only velocity divergence and shearing vorticity, vertical variations of the wind direction only curvature vorticity and direction divergence. The Coriolis parameter appears only in the curvature vorticity equation, not in the shearing vorticity equation. Hence, the effect of wind divergences is completely different with regard to the production of absolute total and absolute curvature vorticity. Anticyclonic shearing vorticity becomes more cyclonal (anticyclonal) through positive (negative) divergences. Of particular significance for the development of divergent air currents is the result that deviations of the horizontal flow from the balanced state—flow without divergence which satisfies the balance equation—contribute only to a production of direction divergence. Since the new equations were derived without simplifications they can be regarded as universally valid. *Subject Headings:* **1. Shearing vorticity equations 2. Curvature vorticity equations 3. Direction divergence 4. Velocity divergence.**—*Author's abstract.*

10.4–169 551.511:551.571:551.579(511)

Hsü, Shu-ying (*Inst. of Geophysics and Met., Academia Sinica*), **Water-vapour transfer and water balance over Eastern China.** *Acta Meteorologica Sinica*, Peking, 29(1):33–43, Feb. **1958.** 15 figs., 13 refs., 4 eqs. In Chinese; English summary p. 43. **DWB**—Using radio soundings and pilot balloon wind observations of Jan. and July 1956, the water vapor transfer and water balance over Eastern China are calculated. Together with the seasonal variations of monsoon circulation, the transfer of water vapor in summer is quite different from that in winter. However, in both seasons the inflow of water vapor from the south is much more important than that either from west or from north. In comparison with the total transfer, the eddy transfer in general is less important, but it is relatively remarkable along the frequent paths of disturbances in the said season. During the month of July 1956, this continent is shown to be a water source. Evapotranspiration is larger than precipitation. *Subject Headings:* **1. Water vapor transport 2. Hydrologic cycle 3. East China.**—*Author's abstract.*

10.4–170 532.13:532.52 551.511.2

Long, Robert R. (*Johns Hopkins Univ.*), **Vortex motion in a viscous fluid.** *Journal of Meteorology*, 15(1):108–112, Feb. **1958.** fig., 7 refs., 48 eqs. **DWB, DLC.** Also issued as:

Johns Hopkins Univ. Dept. of Civil Engineering, Contract Cwb-8962, Project NR-082-104, Contract Nonr-248(31), Technical Report, No. 6, June **1957.** 19 p. 7 refs., 48 eqs. **DWB** (532.5 J65t)—A discussion is given of a three-dimensional vortex in a viscous fluid. A theory is outlined that leads to a reduction of the steady-state Navier-Stokes equations of an incompressible fluid to three ordinary, nonlinear, differential equations. Although no numerical results are available, qualitative arguments based on these equations and on the form of their dependent and independent variables throw considerable light on the structure of the vortex. One important result is that the vertical velocity is of the same order of magnitude as the horizontal velocity. *Subject Headings:* **1. Vortex structure 2. Fluid dynamics 3. Vortex motion in fluids.**—*Author's abstract.*

10.4–171 551.511.13

Van Mieghem, Jacques (*Univ. of Brussels, Belgium*), **Energy conversions in an inviscid and dry atmosphere.** *Meteorological Society of Japan, Tokyo, 75th Anniversary Vol. of the Journal*, pub. Nov. **1957.** p. 116–118. 3 refs., 2 eqs. **DWB, DLC**—Critical remarks on some results deduced from the classical expressions of the potential and internal energy of vertical air columns of infinite extent. *Subject Heading:* **1. Energy conversions.**—*Author's abstract.*

10.4–172 551.511.2:533.7

Čadež, Marijan (*Belgrade, Yugoslavia*), **Transport der inneren und kinetischen Energie in der Atmosphäre.** [Transport of internal and kinetic energy in the atmosphere.] *Germany. Deutscher Wetterdienst, Berichte*, 5(38):19–21, **1957.** 10 refs., 10 eqs. **DWB, DLC**—In the atmosphere the internal and kinetic energy is transferred from air particle to air particle with the velocity of sound. It is shown by thermodynamic considerations that the propagation intensity of kinetic energy is greater than the velocity of sound. The energy equation of an open system can be written in the form

$$\frac{\partial}{\partial \tau}\int_D (U+P+K)\rho d\tau = \frac{dQ}{dt} + \int_\sigma p V_n d\sigma + \int_\sigma (U+P+K)\rho V_n d\sigma,$$

where U, P, K—internal gravitational kinetic energy of unit mass, dQ/dt—heat advected to the system per unit time, V_n—normal component of the motion vector upon the surface ρ of the system (positive when directed internally), p and ρ—barometric pressure and air density, $d\tau$—volume element, $d\sigma$—surface element of the system. From this equation it is evident that the total change of energy content of the system is equal to the energy flow through the surface: namely, radiant and advective heat, internal and kinetic energy with sound velocity and internal kinetic and gravitational energy with wind velocity. The energy transformation in the open system is discussed. *Subject Headings:* **1. Kinetic energy in atmosphere 2. Energy equations.**—*I.L.D.*

10.4–173 551.511.2:551.513.2:551.524.4

Kuo, Hsiao-Lan (*M. I. T., Dept. of Met.*), **Further studies of thermal convection.** Mass. Institute of Technology. Dept. of Meteorology, Contract AF 19(604)-1000, Scientific Report, No. 7, General Circulation Project, Feb. 1, **1957.** 47 p. fig., 3 tables, 21 refs., 21 eqs.—Pt. I is concerned with the stability of the thermally driven motions in a rotating fluid. In this part, the transitions from the lower forced symmetric regime to the wave regime, within the wave regime itself, and from the wave regime into the upper symmetric regime are discussed. It is found that the main features of these various transitions obtained by Fultz in some new experiments can be explained by the theories developed in this note and in the previous studies. In Pt. II, some aspects of fluid motions produced by horizontal differential heating are discussed by applying energy integrals. It is shown that if the various quantities are decomposed into an average and an eddy departure, then the eddy potential and eddy kinetic energies must increase or decrease at the same time. In the case of motion produced by horizontal differential heating, there will be both an average horizontal heat transport, from the heat source to the cold source, and an upward transport, which results in a stable stratification. The mean vertical temperature contrast so produced is proportional to the mean horizontal temperature contrast and is of the same order of magnitude. In Pt. III, the mean temperature distribution

resulting from the thermal convection produced by uniform heating from below is determined by applying the thermal energy integrals. It is shown that each time a new mode of convection is introduced, the Nusselt number will be increased by l and when there are N modes present, it will be $N+l$. In case of large N, large convective heat transfer extends very near to the boundaries. *Subject Headings:* **1. Thermal convection 2. Heat and momentum transport 3. General circulation 4. Temperature distribution.**—*Author's abstract.*

10.4–174 551.511.2:551.556.3

Spilger, Werner, **Remarks about energy conversion and trigger effects in the atmosphere.** Presented at the 147th national meeting of the American Meteorological Society in Albuquerque, New Mexico, Sept. 5, 1956. **1956.** 9 p. 4 figs. Mimeo. **DWB** (M11 S756r)—A novel idea is expounded and illustrated for producing artificial trigger action under unstable atmospheric conditions, by means of a wind machine or propeller. This artificially induced convective action would maintain itself naturally, and the energy of the winds associated with the thermals would be realized by feathering or altering the blade setting of the wind machine so that the natural winds would drive a wind generator. A note pencilled into the manuscript states that the idea was patented by POMYKALA of Mobile, Ala., on April 3, 1956 (Pat. No. 2,740,663). *Subject Headings:* **1. Energy transformation 2. Artificial convection triggering 3. Wind machines.**—*M.R.*

10.4–175 551.511.3:551.558.2

Kubota, S. (*Met. Res. Inst., Tokyo*), **On the vertical distribution of vertical velocity.** *Meteorological Society of Japan, Tokyo, 75th Anniversary Vol. of the Journal*, pub. Nov. **1957.** p. 126–129. 2 figs., 4 tables, 3 refs., 4 eqs. **DWB, DLC**—In this paper the author investigated the vertical distribution of vertical velocity, by applying the double-Fourier series to the ω-equation. And we can conclude that the parabolic distribution usually assumed in the parametric representation does hold generally in the large scale disturbances, but its validity is questionable for the small scale disturbances. It may be said that the level of the maximum vertical velocity locates at the 500 mb level for the large scale, and at the 700 mb level for the small scale disturbances, and such displacement depends upon the stability of the atmosphere. *Subject Heading:* **1. Vertical velocity gradient.**—*Author's abstract.*

GENERAL CIRCULATION

See also: **General circulation studies** (M.I.T.), 10.4–2; **Momentum transport** (Ozawa, Tomatsu), 10.4–131; **Thermal convection** (Kuo), 10.4–173; **Tropical cyclone theory and atmos. circul. anomalies** (Ballenzweig), 10.4–193; **Air mass modification over sea, Japan** (Uda), 10.4–299.

10.4–176 551.513.2:551.557.5(729)

Alaka, M. A., **Case study of an easterly jet stream in the tropics.** *Tellus*, Stockholm, 10(1):24–42, Feb. **1958.** 12 figs., 2 tables, 15 refs., 14 eqs. **DWB, DLC**—An easterly current at 200 mb over the southern Bahamas and Florida is identified as a jet stream which had originated in middle latitudes and had travelled along the eastern periphery of the dynamic anticyclone situated over the southeastern U. S. The properties of this current are studied and compared with those associated with middle latitude jet streams. It is found that, although this current is comparatively weak (core velocity about 70 kts), horizontal and vertical wind shears near its axis are comparable with those observed near the usually much stronger middle latitude jet streams. The mechanism responsible for the concentration of the kinetic energy in this narrow current is shown to be independent of any temperature contrast between two air masses in the lower and middle troposphere. The jet is further shown to be maintained by pressure heads and the continuous production and destruction of kinetic energy involved in its maintenance and motion occur as a result of accelerations in more or less laminar flow rather than by lateral or frictional stresses. Finally, the observed weather distribution is found to be influenced by the resonance and interference of the upper jet stream with waves in the lower easterlies. (For abstract on this title from another source, *see* 7.10–152, Oct. 1956, *MAB.*) *Subject Headings:* **1. Easterly jet stream 2. Tropical analysis 3. Caribbean Region.**—*Author's abstract.*

10.4–177 551.513.2:551.557.5:551.515.8

†Flohn, H., **Luftmassen, Fronten und Strahlströme.** [Air masses, fronts and the jet stream.] *Meteorologische Rundschau*, 11(1):7–13, Jan./Feb. **1958.** 5 figs., table, 27 refs. English summary p. 7. **DWB, DLC**—The air mass concept of the Norwegian school has declined in importance in recent years because: 1) it could not be extended to the tropical latitudes, 2) the influence of an air mass is limited to the lower 2000 m of the atmosphere, and 3) the impossibility of representing air masses objectively by means of frequencies of various properties. The frontal zones correspond—as a result of the well-known Stüva-Margules relationship between horizontal temperature gradient and vertical wind change (thermal wind)—to the jet streams. The different types of jet streams are described: namely, polar front jet streams, subtropic jet streams, stratospheric polar jet streams, tropical east jet streams, and Krakatoa winds. The mean spatial arrangement of the jet streams is analyzed. "The existence of the super-geostrophic winds in the core of the tropospheric jet streams can be explained by the convergence of the large scale horizontal transport of momentum." "The construction of geostrophic trajectories reveals inconsistency of the air mass concept with the large wind shear in the upper troposphere and lower stratosphere. On the base of the thermotropic model and a modification of the vorticity equation the vertical wind components in samples of synoptic structures are computed and combined to an idealized cyclone model. The resulting (adiabatic) convective temperature is the same as the advective variations; non-adiabatic processes can yield similar values." The persistence of discontinuities in the wind and temperature field, as indicated by jet stream studies over Kimpo, Korea and the fine structure of the jet stream by meso-scale synoptic analysis, etc. are discussed. *Subject Headings:* **1. Air masses 2. Fronts 3. Jet stream studies.**—*I.L.D.*

10.4–178 551.513.2:551.557.5

†Koteswaram, P., **Easterly jet stream in the tropics.** *Tellus*, Stockholm, 10(1):43–57, Feb. **1958.** 10 figs., 31 refs. **DWB, DLC**—It is shown that in summer an easterly jet stream overlies southern Asia in the high troposphere with core near 15°N. This current is quasi-geostrophic. Below the level of strongest winds, temperatures decrease from right to left across the current looking downstream; above the level of strongest wind (150–100 mb) the reverse is true. Distribution of cloudiness and precipitation in the lower monsoon correspond to that noted in association with westerly jet streams in the temperate zone: precipitation downstream from the region with the highest winds to left of the axis, upstream to the right. The foregoing holds on individual days, and climatically during the monsoon season, as a whole. Since an easterly jet stream is observed only over southern Asia (and Africa), but not over the Pacific and Atlantic oceans, it is suggested that the current originates in connection with the large-scale arrangement of land masses and oceans, and with the elevated heat source of the Tibetan Plateau. (For abstract on this from another source, *see* 8.6–202, June 1957, *MAB*.) *Subject Heading:* **1. Easterly jet stream.**—*Author's abstract.*

10.4–179 551.513.2:551.511.2

Kuo, H.-L. (*M. I. T.*), **Further studies of thermally driven motions in a rotating fluid.** *Journal of Meteorology*, Boston, 14(6):553–558, Dec. **1957.** fig., 3 tables, 5 refs., 22 eqs. **DWB, DLC.** Also in: Massachusetts Institute of Technology. Dept. of Meteorology, Contract AF 19(604)-1000, Final Report, Dec. 31, **1957.** p. 309–355. 2 figs., 3 tables, 21 refs., 21 eqs. **DWB**—The transitions from the lower forced symmetric regime to the wave regime, within the wave regime itself, and from the wave regime to the upper symmetric regime, are discussed by making use of the solution of a simplified version of the differential equation. It is found that the main features of these various transitions obtained by FULTZ in some new experiments can be explained by the theories developed in this note and in the previous studies. *Subject Headings:* **1. General circulation 2. Rotating fluid experiments 3. Heat and momentum transport.**—*Author's abstract.*

10.4–180 551.513.2:551.557.5(52)

Mohri, Keitaro (*Japan Met. Agency, Tokyo*), **A note on an extremely strong jet stream on February 8, 1953.** *Meteorological Society of Japan, Tokyo, 75th Anniversary Vol. of the Journal*, pub. Nov. **1957.** p. 173–175. 4 figs., ref. **DWB, DLC**—A meridional cross section, Feb. 8,

1953 for Japan and the Far East which shows an extremely strong jet stream with maximum observed speed of 192 m sec^{-1} is presented. Baroclinic field associated with the jet is remarkable, suggesting that the strong cold outbreak is related to the strong jet. *Subject Headings:* **1. Jet stream speed 2. Jet stream effects on cold outbreaks 3. Cold air outbreaks 4. Far East 5. Japan.**—*Author's abstract.*

10.4–181 551.513.2:551.311.184(98)

Winchester, James W. and Bates, Charles C. (*both, U. S. Navy Hydrographic Office, Wash., D. C.*), **Meteorological conditions and the associated sea ice distribution in the Chuckchi Sea during the summer of 1955.** (In: Polar Atmosphere Symposium, Oslo, July 2–8, 1956, **Proceedings, Pt. 1, Meteorology Section.** N. Y., Pergamon Press, 1958. p. 323–334. 11 figs., 2 refs.) Also issued in: *Journal of Atmospheric and Terrestrial Physics, London, Special Supplement,* Pt. 1, 1957, pub. **1958.** p. 323–334. **DLC**—A combination of circumstances, some of which are not entirely understood, combined to keep the polar pack ice from receding off the northern coast of Alaska during the summer of 1955. As a result, the worst ice year in at least the past 11 yrs occurred, and over forty ships of the U. S. Navy's Task Force 5 had their exit blocked for 2 weeks at what was normally the height of the shipping season. Although the 30-day weather forecast prepared in early August 1955 indicated normal surface warming and frequent offshore winds in the Chuckchee Sea area, by Aug. 14 an unusually deep polar vortex was forming which steered the frequent Siberian storms either into the western Canadian Archipelago or the Polar Basin. Such a mean storm track gave a steady onshore flow of cold moist air, which markedly slowed disintegration of the pack ice, closed the Chuckchee Lead, gave rise to appreciable amounts of snow as early as Aug. 20 at Point Barrow, and caused sporadic re-freezing of the leads by mid-August; however, the permanent reversal of heat budget did not occur until early October. It was not until this polar vortex began to break down about Sept. 5 that storms did take a more southerly track across the Bering Sea and central Alaska. Once this more normal track was established, the stagnation of a 975 mb storm in the Bering Sea on Sept. 5–8 created, at least in part, the offshore lead which permitted supply operations to again be conducted along the northern Alaskan coast. The behavior of the polar pack's margin under these anomalous meteorological conditions is described and sample verifications of ice forecasts given. *Subject Headings:* **1. Polar vortexes 2. Pack-ice disintegration anomalies 3. Polar weather anomalies 4. Sea ice distribution 5. Bering Sea 6. Chuckchee Sea.**—*Authors' abstract.*

10.4–182 551.513.2:551.557.5

Wright, D. S. (*Central Office, Melbourne*), **The use of indices in following the trend in surface synoptic patterns—in particular, as indicating the possibility of the persistence of a large quasi-stationary trough south of Australia.** *Australian Meteorological Magazine,* Melbourne, No. 20:30–38, March **1958.** 7 figs., 6 refs. **DWB**—Indices of the westerly surface circulation from 35–50°S and 40–175°E were plotted as running 5-day means, as also that at the 300 mb level, over the Australian area from 115–165°E; for the latter, the mean strength of the jet stream was used as an index. Peak values of both indices were found to coincide with the occurrence of a large quasi-stationary trough south of the Continent. *Subject Headings:* **1. Circulation patterns 2. Synoptic indices 3. Southern Hemisphere circulation 4. Jet stream effects on general circulation.**—*Author's abstract.*

10.4–183 551.513.3:551.511.32

Chekirda, A. Z., **K gidrodinamicheskoĭ teorii tsentrov deĭstviia atmosfery.** [Hydrodynamic theory of atmospheric centers of action.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.,* No. 7:954–958, July **1957.** 2 figs., 2 tables, 2 refs., 11 eqs. **DLC**—FRIDMAN's equation of change of vorticity projected along a vertical axis is the starting equation in BLINOV's hydrodynamic theory of centers of action. The solution relative to west-east transport was sought in a resolution of the function of flow into a series of spherical functions. It was assumed that pressure, temperature and density were independent of height. BLINOV reduced the problem to the solution of the equation

$$\alpha_1 \Delta\rho + 2\omega\varphi = F(\theta,\lambda)$$

α—circulation index, ω—angular velocity of earth's rotation, θ, λ—spherical coordinates

(θ—complement of latitude, λ—longitude). The solution of this equation by BLINOV is given. This equation is used by the author to compute the atmospheric pressure at sea level. The resolution of the function $F(\theta^2\lambda)$ into a suitable form is presented. Charts showing actual and calculated distribution of pressure at sea level are presented and good agreement is shown. *Subject Headings:* **1. Centers of action 2. Hydrodynamic theories.**—*I.L.D.*

10.4–184 551.513.7:551.515.2(213)

§Ballenzweig, Emanuel M. (*Ext. Fore. Sec., U. S. W. B., Wash., D. C.*), **The weather and circulation of September 1957, including a discussion of tropical storm activity.** *Monthly Weather Review*, Wash., D. C., 85(9):315–325, Sept. **1957.** 9 figs., 2 tables, 16 refs. **DWB** September was characterized by a reversal of circulation patterns of July and August with a mid-continent trough and coastal ridges. Blocking occurred in Greenland and the Bering Sea, instead of in N.W. Canada as in Aug. Four tropical cyclones, of which 2 were hurricanes, developed in the Atlantic and Gulf. Three formed in E. Pacific and 6 in the W. Pacific. Sea surface temperature was higher than critical limit of 81°F set by PALMÉN, and well above long period average. Tropical storms in Atlantic are related to 5-day mean circulation. *Subject Headings:* **1. Atmospheric circulation anomalies 2. Tropical cyclones, Sept. 1957 3. Hurricane-sea surface temperature relationships 4. North Atlantic 5. Pacific Ocean.** —*M.R.*

ATMOSPHERIC DISTURBANCES

See also: **Storm surge bibliogs.** (I.U.G.G.), 10.4–65; **Thunderstorm effects on aircraft** (Banfe), 10.4–80; **Cut-off lows, Great Basin** (Vore, McCarter), 10.4–134; **Cloud seeding & thunderstorm suppression, U.S.S.R.** (Chuvaev), 10.4–143; **Air masses, fronts, and jet stream** (Flohn), 10.4–177; **Atmos. circulation anomalies and tropical cyclones, Sept. 1957** (Ballenzweig), 10.4–184; **Hurricane behavior and sea-atmos. rel.** (Fisher), 10.4–218; **Tropospheric temp. change in anticyclones, Lindenberg, Germany** (Grasnick), 10.4–219; **Atmos. oscillations** (Rocard), 10.4–223; **Volcanic eruption effects on thunderclouds, Asama Volcano, Japan** (Komabayasi), 10.4–260; **Air mass modification over sea, Japan** (Uda), 10.4–299.

10.4–185 551.515:551.577.37

Bradbury, Dorothy L. (*Chicago Univ.*), **Moisture analysis and water budget in three different types of storms.** *Journal of Meteorology*, Boston, 14(6):559–565, Dec. **1957.** 7 figs., table, 5 refs., 5 eqs. **DWB, DLC.** Also in: Chicago. Univ. Dept. of Meteorology, Contract AF 19(604)-1293, Final Report, Feb. **1957.** Sec. I. (14 p.). 7 figs., table, 4 refs. **DWB**—With use of the mean observed wind and mean mixing ratio in layers of 100 mb thickness, the water budget was computed for three different types of cyclone development in the Midwest: March 21–22, 1955; Nov. 23–27, 1952 and Oct. 23–25, 1956. The results indicated a fair agreement between the computed and observed amounts of precipitation. There were indications that the free water in the form of cloud droplets may remain in suspension for several hours before being released as precipitation. The relationship between the integrated moisture patterns and the observed precipitation distribution was determined. There appears to be a maximum precipitation area on the forward left side of the axis of maximum water vapor content. In the absence of thunderstorm activity the limit of the rain area towards the warm side appears to coincide very nearly with the line of zero mean vorticity. However, no such agreement exists between the cold limit of the rainfall area and the vorticity distribution. *Subject Headings:* **1. Storm rainfall analysis 2. Precipitation distribution 3. Midwest, U. S.**—*Author's abstract.*

10.4–186 551.515:551.461.2(52)

Miyazaki, Masamori (*Japan Met. Agency*), **On storm surges which recently struck the Japanese coast.** *Oceanographical Magazine*, 9(2):209–225, Dec. **1957.** 5 figs., 13 tables, 11 refs., eq. **DWB, DLC**—This paper presents a summary report on storm surges that struck the Japanese Coast during the period 1900 through 1957. The data on the sixty surges reported here were collected from the *Meteorological Review, Memoirs of the Central Meteorological Observatory*, and others. Surges whose heights were more than 2 m were observed

6 times during the first 50 yrs. Those with more than 1 m of height were observed 10 times during the following 8 yrs. Destructive surges originate from typhoons. Various bays affected are listed. *Subject Headings:* **1. Storm surges 2. Japan.**—*N.N.*

10.4–187 551.515.1:551.43(515)

Chow, Shiao-ping and Koo, Chen-chao (*both, Inst. of Geophysics and Met., Academia Sinica*), **The influence of the slope of a plateau on the movement of troughs and ridges.** *Acta Meteorologica Sinica*, Peking, 29(2):99-103, May **1958.** 3 figs., 4 refs., 6 eqs. In Chinese; English summary p. 103. **DWB**—It is demonstrated in this paper that the phase velocity of the troughs and ridges moving along the slope of a plateau or a mountain range should be affected by the slope according to the formula (6). It is shown in Fig. 3, that this is in fairly good agreement with the synoptic experience that the systems move slower on the southern periphery of the Tibetan plateau than those on the northern one. *Subject Headings:* **1. Orographic troughs 2. Orographic ridges 3. Troughs and ridges 4. Tibet.**—*Authors' abstract.*

10.4–188 551.515.13

Miller, Banner I. (*U. S. W. B., Miami, Fla.*), **On the maximum intensity of hurricanes.** *Journal of Meteorology*, Boston, 15(2):184–195, April **1958.** 8 figs., 3 tables, 11 refs. **DWB, DLC**—The minimum pressure that can occur within a hurricane is related to the temperature of the sea surface over which it moves. This is done by making certain assumptions and synthesizing an eye sounding, which is used to compute the lowest pressure of the storm. The validity of the computed sounding is tested on eight hurricanes. A series of composite 200 mb charts is constructed from five of the eight hurricanes which reached great intensity to show one synoptic situation which results in maximum deepening. These are contrasted to a similar series of composite charts prepared for storms which reached only minor intensity. *Subject Headings:* **1. Hurricane intensities 2. Deepening.**—*Author's abstract.*

10.4–189 551.515.11(764) 551.509.31

§Martin, Robert H. and Bucci, Andrew (*both, Natl. Wea. Analysis Center, U. S. W. B., Wash., D. C.*), **A comparison of two redeveloping Texas lows, January 1958.** *Monthly Weather Review*, Wash., D. C., 86(1):29–40, Jan. **1958.** 8 figs., 3 refs. **DWB, DLC**—Two major cyclonic storms causing torrential rain, snow or cold waves, formed at almost the same spot (near Brownsville, Tex.) on Jan. 5 and Jan. 12, 1958, followed different courses toward Newfoundland and produced different weather patterns as shown by synoptic charts (sea level, 500 mb and 1000–500 mb thickness) showing 300 mb jet stream and other developments on Jan. 7, 8, and 9 and 14, 15 and 16th, respectively. In the first storm, the jet was deep and meridionaly oriented; in the second broad and shallow with a zonal orientation. A very thorough discussion of the developments and features of each day's charts is presented, to show similarities and differences. *Subject Headings:* **1. Cyclones, Texas (1958) 2. Synoptic case histories 3. Eastern United States.**—*M.R.*

10.4–190 551.515.12:551.577.11(762)

Newton, C. W., (*Univ. of Chicago*), **Convective precipitation in an occluded cyclone.** *Meteorological Society of Japan, Tokyo, 75th Anniversary Vol. of the Journal*, pub. Nov. **1957.** p. 243–255. 15 figs., 25 refs. **DWB, DLC.** Also issued in: Chicago. Univ. Dept. of Meteorology, Contract Cwb-8950, Final Report, Pt. 2, issued **1957. DWB** (M15 C532fi)—The general processes leading to the development of convective precipitation ahead of a major cyclone are discussed, including the effects of horizontal advection and vertical motions on the creation and triggering of potential instability. By the use of hourly rainfall charts for the Mississippi Valley, the history of development of a relatively narrow streak of heavy rainfall for Nov. 18–19, 1948 is illustrated. Heaviest rain occurred where several individual large rainstorms moved successively over nearly the same path. These rainstorms formed in a rather small area over a period of 16 hrs. While the earliest formation took place in the region of greatest instability and general upward motions, no reason could be found for the successive formation of rainstorms in one locality. The analysis suggests quite definitely that the answer does not lie in any stationary feature of the general large-scale flow field. *Subject Headings:* **1. Cyclonic precipitation 2. Occluded cyclones 3. Mississippi Valley.**—*Author's abstract.*

10.4–191 551.515.13:551.509.311:551.542

Klein, William H. and Winston, Jay S., (*Extended Forecast Section, U. S. W. B., Wash., D. C.*), **Geographical frequency of troughs and ridges on mean 700-mb charts.** Washington, D. C., U. S. Weather Bureau, June, **1958.** 12, [4] p. 48 figs., 2 tables, 16 refs. Mimeo. **DWB** (M15.13 U587ge)—The geographical frequencies of occurrence of troughs and ridges on both 5-day and 30-day mean 700 mb charts for the Northern Hemisphere during a long period of record are presented for individual months. Many regions of maximum and minimum frequency show a close relationship to trough and ridge positions on long period mean, or normal, 700 mb charts. However, even cursory inspection of these frequency charts shows that they yield considerably more information for both the practicing forecaster and the research worker than can be derived solely from normal maps. Preferred trough and ridge locations and their monthly changes appear to be related largely to land-sea boundaries with their associated thermal influences and also to prominent orography. *Subject Headings:* **1. Trough frequencies 2. Ridge frequencies 3. Northern Hemisphere pressure charts.**—*Authors' abstract.*

10.4–192 551.515.13 551.515.73

Klein, William H. (*U. S. W. B., Wash., D. C.*), **Prevailing tracks of lows and highs, Pts. 1—6.** *Weatherwise*, Boston, 9(3):83–87, June **1956**; 9(4):128–131, Aug. **1956**; 9(5): 158–161, Oct. **1956**; 9(6):205–209, Dec. **1956**; 10(2):50–53, April **1957**; and 10(3):85–89, June **1957.** figs. **DWB**—Each of these 6 articles contains a discussion of the principal tracks of lows and highs around the Northern Hemisphere as shown on 6 series of 4 charts, two for each month and two monthly to each article, starting with July and August and ending with May and June. Prominent features of each chart or season and inter-seasonal changes are noted. Most cyclones tend to have a northward component or motion, whereas high latitude anticyclones move southward and mid latitude highs eastward. Both cyclone and anticyclone tracks are farthest south in Feb. and farthest north in Aug. Cyclogenesis is most frequent to the lee of mountain ranges and over warm bodies of water or frontal zones along southeast coast of continents. Cyclones prefer warm surfaces, especially water, and flat terrain; anticyclones prefer cold surfaces and mountainous areas. The Great Basin of the U. S. is one of the most active in the world for both cyclo- and anticyclogenesis. *Subject Headings:* **1. Cyclone tracks 2. Anticyclone tracks 3. Northern Hemisphere charts 4. Northern Hemisphere.**—*M.R.*

10.4–193 551.515.2:551.513.7:551.509.22

Ballenzweig, Emanuel M., **Relation of long-period circulation anomalies to tropical storm formation and motion.** U. S. Weather Bureau, March 18, **1958.** 20 p. 25 figs., 26 refs. **DWB** (M15.21 U587re)—Tropical cyclone frequency in the entire North Atlantic and in the preferred sites of tropical cyclogenesis in the Atlantic undergoes fluctuations which composite charts show to be related to the form and position of the planetary waves. Long-period conditions, propitious for tropical storm formation in particular areas of the Atlantic, show some rather well-defined circulation patterns which are not alike for all areas. These varying circulation patterns are also shown to form the framework for steering tropical cyclones after their generation. It is concluded feasible to use the various composite charts as guides in the preparation of long-range forecasts of hurricane formation and motion. *Subject Headings:* **1. Atmospheric circulation anomalies 2. Tropical cyclone theories 3. Long range hurricane forecasting.**—*Author's abstract.*

10.4–194 551.515.2:551.509.52:550.342

Iyer, H. M., **A study on the direction of arrival of microseisms at Kew Observatory.** *Geophysical Journal*, London, 1(1):32–43, March **1958.** 6 figs., 3 tables, 15 refs., 13 eqs. **DWB**—A modification of DARBYSHIRE's correlation method to study the direction of arrival of microseisms is used to track three fast-moving cyclonic depressions in the Atlantic during the periods Oct. 1951, Oct. 1952 and Dec. 1956. Good agreement between the calculated and actual bearings of the storm center is obtained when the depression is reasonably far away from coastal regions and has a simple meteorological situation. When the storm is close to the coast, however, multiple sources of microseisms make tracking unreliable. Filter-

ing the waves and using a narrow band about the spectral peak and using longer records improves the accuracy. In all the cases studied, the microseisms contain an appreciable amount of Love waves. The ratio of intensity of Love waves to Rayleigh waves seems to depend on the position and intensity of the storm center. *Subject Headings:* **1. Microseismic storm detection 2. Cyclonic microseisms 3. Atlantic Ocean.**—*Author's abstract.*

10.4–195 551.515.2(76)

Moore, Paul L. et al. (*all, W. B. Office, Miami, Fla.*), **The hurricane season of 1957.** *Monthly Weather Review*, Wash., D. C., 85(12):401–408, Dec. **1957.** 3 figs., 15 refs. **DWB, DLC**—Eight tropical storms, 3 of which were of hurricane force, occurred during 1957 in the Atlantic and Gulf. Each of these storms is discussed in some detail, especially "Audrey" of June 25–28, which was the most destructive. As in 1956 most storms hit the Gulf Coast rather than the East Coast. During "Carrie," a ship sank near the Azores with loss of 80 lives. Property damage was $152 million for the U. S. and 390 lives were lost and 192 persons missing in "Audrey," the greatest loss of life since the 1938 New England hurricane. *Subject Headings:* **1. Hurricanes, 1957 2. Hurricane "Audrey" (1957) 3. Hurricane damage 4. Gulf Coast, U. S.**—*M.R.*

10.4–196 551.515.2:551.556.8:551.461.23

*Pore, Arthur (*U. S. W. B., Wash., D. C.*), **Ocean surface waves produced by some recent hurricanes.** *Monthly Weather Review*, Wash., D. C., 85(12):385–392, Dec. **1957.** 5 figs., table, 9 refs. **DWB, DLC**—An analysis of wave and swell conditions in 6 recent hurricanes ("Hazel," 1954; "Connie," "Diane" and "Janet," 1955; "Betsy" 1956 and the Gulf hurricane of 1950) shows that maximum wave heights, 60–480 mi from the center, occur as often in the right front as in the right rear quadrant, and in "Connie" not much difference was found between left and right quadrants. Furthermore, wave and tide records show that wind conditions in advance of a hurricane are as important as swell in determining water level at coastal points. Mature hurricanes do not show much change in swell from day to day. Composite charts of wave height, direction and period are given for different stages of each storm and composite wind charts for "Connie" and "Diane." *Subject Headings:* **1. Hurricane waves 2. Hurricane tides 3. Hurricane "Connie" (1955) 4. Hurricane "Diane" (1955).**—*M.R.*

10.4–197 551.515.21:551.558

Miller, Banner I. (*U. S. W. B. Off., Miami, Fla.*), **Three-dimensional wind structure around a tropical cyclone.** *U. S. Weather Bureau, National Hurricane Research Project Report*, No. 15, Jan. **1958.** 41 p. 16 figs., 8 refs. **DWB** (M15.2 U5845r)—A composite picture of the divergence, vertical motion and vorticity in and around an Atlantic hurricane in layers of 1–3, 3–6, 6–10, 10–12.5 and 12.5–16 km above sea level is presented in numerous charts and is analyzed. Data from storms south of 35°N, for 1946–56 (mostly from "Hazel," 1954; "Connie," "Diane," "Ione" and "Janet," 1955; and "Betsy" 1956) were tabulated (1047 observations at 6 km) by 20 squares of lat. and long. relative to the center of the storm. Methods of determining mean wind for a layer, areal means, etc. are discussed and sources of error analyzed. Charts show tangential speed, radial motion, radial motion relative to center, mean wind field, mean divergence and vertical motion in the several layers, respectively. Cross sections and profiles are also shown graphically. Results support RIEHL's and SIMPSON's models except that these are considered to be over-simplified. A number of rules are derived for each of the components analyzed. *Subject Headings:* **1. Hurricane models 2. Vertical motion in hurricanes.**—*M.R.*

10.4–198 551.515.23(213)

Malkus, Joanne S. (*Woods Hole Oceanog. Inst.*), **Tropical weather disturbances—why do so few become hurricanes?** *Weather*, London, 13(3):75–89, March **1958.** 8 figs., 8 refs. **DWB**—The monotony of weather in the tropics is only a partial truth—temperature and wind at the surface are uniform but precipitation is extremely variable, most of the rain falling on a few days when there is organized activity. This activity is more noticeable at high levels where humidity, temperature and winds are extremely variable in contrast to surface regularity

Upper air disturbances are almost as frequent in the tropics as are surface disturbances in mid-latitudes. Closed lows develop quite often but few of these become fullfledged hurricanes. The necessary mechanism seems to be connected with the formation of the eye, or of a warm core of isolated ascending air surrounded by the cold cloud-rain area. The eye may be 10–15° warmer and the pressure 3–6% lower than normal. Other features such as outflow of the moist air from the rain area seem to be required to produce and maintain a real hurricane. The cloud tops must penetrate to high levels also. *Subject Headings:* **1. Tropical disturbances 2. Hurricane formation.**—*M.R.*

10.4–199 551.515.23(75)

Mook, Conrad P.; Hoover, Eugene W. and Hoover, Robert A. (*all, U. S. W. B. Forecast Center, Wash. National Airport*), **Analysis of the movement of hurricane off the east coast of the United States, Oct. 12–14, 1947.** *Monthly Weather Review*, Wash., D. C., 85(7):243–250, July **1957.** 8 figs., 2 tables, 8 refs. **DWB, DLC**—A detailed post-analysis based on reports from ships in the vicinity of the erratic hurricane of Oct. 1947 (only one ship reported at the time) showed the more nearly true course of the storm and the 3 or 6 hourly positions and pressure patterns (by surface and 500 mb synoptic charts), winds, etc. in the area. The storm was unique in crossing Florida toward Bermuda and then curving sharply back to hit Savannah, Ga., at the point of looping and retrogression. Three cloud seeding planes were operating in the hurricane. A weaker storm a week earlier followed a parallel course. *Subject Headings:* **1. Hurricane, South Atlantic States (Oct. 1947) 2. Recurvature of hurricanes 3. South Atlantic States.**—*M.R.*

10.4–200 551.515.23:551.511.3

Sellick, N. P. (*Rhodesia and Nyasaland Met. Service, Salisbury, S. Rhodesia*), **Modification of the structure of a tropical cyclone on traversing a high plateau.** *Royal Meteorological Society, Quarterly Journal*, London, 84(361):259–269, July **1958.** 4 figs., 4 tables, 6 refs., 4 eqs. **Discussion** by R. S. Scorer et al., *Ibid.*, 85(363):69–71, Jan. **1959.** fig. **DWB, DLC**—Apparent continuity is established between an Indian Ocean cyclone which reached the coast of southern Africa and a disturbance which traversed the continent from east to west. The surface structure of the disturbance is established from autographic records of its passage over the Rhodesias and Nyasaland. The pressure field is fitted to the "normal" vortex of AMES (1950) and the upper winds observed are in fair accord. The surface observations indicate the presence of broad belts of northwest and southeast winds with a fairly abrupt transition, but there is no evidence of fronts. Precipitation of the order of 50 mm per day is recorded over wide areas on several successive days. From consideration of the observed moisture content of the atmosphere, it is inferred that an inflow of the order of 2 m/sec in the lowest layers is required to account for the precipitation. Elementary dynamic theory requires that such an inflow be accompanied by increasing circulation and deepening of the system. The depression, however, weakened and filled up slowly and it is shown that a reasonable allowance for turbulent and frictional losses would account for this. *Subject Headings:* **1. Tropical cyclone structure 2. Cyclone dynamics.**—*Author's abstract.*

10.4–201 551.515.8

Čadež, M., **A légkör diszkontinuitási felületeinek alakjáról.** [Pattern of atmospheric discontinuity surfaces.] *Időjárás*, Budapest, 61(4):241–244, July/Aug. **1957.** 4 figs., 4 refs., 4 eqs. German summary p. 241. French version p. 305–306. **DLC**—It is shown that two air masses having different temperature gradients and opposite wind directions are divided by parabolic frontal surfaces. If such fronts move over mountain ranges they may pass over in place in the upper air long before they appear on the surface, as shown by the example of Negotin, a station east of Homolje Mountain. *Subject Headings:* **1. Discontinuity surfaces 2. Negotin, Yugoslavia.**—*G.T.*

10.4–202 551.515.8:551.515.13

Manabe, S. (*Geophys. Inst. Tokyo Univ.*), **On the modification of air-mass over the Japan Sea when the outburst of cold air predominates.** *Meteorological Society of Japan, Journal, Ser.* 2, 35(6):311–326, Dec. **1957.** 19 figs., 3 tables, 20 refs., 10 eqs. **DWB**—Japan Sea is

generally considered to be one of the places where the most rapid air mass transformation takes place in the winter season. As it is surrounded by a dense network of radiosonde and surface stations, quantitative investigation about the modification of air mass is possible. Selecting the period of a typical continuous outburst of cold air from Dec. 20, 1954 to Jan. 3, 1955, during which the air-sea temperature difference exceeded 10°C, the author computed the integrated net flux divergence of enthalpy and water vapor, and their vertical transport at the standard levels in the lower half of the troposphere, and further estimated the amount of heating and cooling due to radiation and condensation. Based on the balance requirement, he obtains the amount of heat or water vapor supplied from the sea to the atmosphere. *Subject Headings:* **1. Air mass modification 2. Cold air outbreaks 3. Japan Sea.**—*From author's abstract.*

10.4–203 551.515.83 551.515.13

Gorshkov, V. E., **K voprosu o zimnem fronto- i tsiklogeneze v severnoĭ chasti Okhotskogo moria.** [The problem of winter fronto- and cyclogenesis in the northern part of the Sea of Okhotsk.] *Meteorologiia i Gidrologiia*, No. 1:36–37, Jan. **1957.** 4 refs. **DWB, DLC.** Trans. into English available. **DWB** (M158 G674on)—S. P. KHROMOV's account of the formation of the winter Arctic front along the northern coasts of the Sea of Okhotsk attributes a weak activity to the Okhotsk orographic front, postulated by him, and ascribes greatest significance to the coastal ridge in the formation of the winter frontal zones. In this article the author summarizes the general circulation and orographic conditions of winter fronto- and cyclogenesis in the northern part of the Sea of Okhotsk. It is shown that orographic conditions and the distribution of air flow over the northern coast of the Sea of Okhotsk do not contribute to the development of winter frontal phenomena. Hence, frontal zones and the associated cyclogenesis along the northern coast are not observed. Instead, the fundamental circulation process in this region is a winter (continental) monsoon. *Subject Headings:* **1. Frontogenesis 2. Cyclogenesis 3. Sea of Okhotsk.**—*I.L.D.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Radiation charts for earth** (Bernhardt, Philipps), 10.4–8; **Solar radiation eff. on plants** (Borisoglebskiĭ), 10.4–87; **Cosmic ray scintillators** (Green), 10.4–120; **Auroral radiations, Alaska** (Ashburn et al.), 10.4–315.

10.4–204 551.521:535.211

Yoshié, K. and Ooba, N., **Etalon secondaire de répartition spectrale dans le spectre visible.** [Secondary standard of spectral distribution in the visible region of the spectrum.] *Revue d'Optique*, Paris, 36(12):561–568, Dec. **1957.** 5 figs., 3 refs. **DLC**—In order to obtain the secondary standards of the spectral energy distribution in the visible region, the authors measured the relative values of the spectral luminances in a given direction of a tungsten ribbon lamp, which is usually used for the standard lamp in optical pyrometry, by comparing with a radiator of which spectral energy distribution is known, i.e., the black body. They examined, then, the precision in which the color temperature given to this lamp could describe its relative energy distribution. *Subject Headings:* **1. Black body radiation 2. Spectral radiation distribution.**—*Authors' abstract.*

10.4–205 551.463:551.521.1:621.47

Beau, M., **Note sur les études et travaux d'André Nizery concernant l'énergie thermique des mers, la production concomitante d'eau douce et l'utilisation éventuelle préalable de bassins de chauffage solaire.** [Memorandum on studies and research conducted by André Nizery on the thermal energy of sea water, the concomitant production of fresh water and the possible preliminary utilization of solar heating tanks.] *UNESCO Arid Zone Research*, 7:225–231, **1956.** 6 refs. English and Spanish summaries p. 229–231. **DWB, DLC**—NIZERY was able to show that during pumping operations it is possible to avoid the risk of mixing the cold water from the depths of the sea with the warm surface water. Experimental work on

his subject, conducted with the assistance of the Laboratoire des Ateliers Neyret-Beylier t Piccard-Pictet at Grenoble, revealed a physical law relating the cold water discharge, the ensity and the density gradient of the sea water to the depth and the maximum thickness of he sheet of cold water sucked in at the bottom of the sea. Other studies of NIZERY briefly ummarized are the working cycle of a power plant with a temperature difference about 20°C, hoice of best evaporator, problem of condensations which makes it possible to obtain large mounts of fresh water as a by-product, etc. *Subject Headings:* **1. Sea water thermal energy . Solar heating.**—*From author's summary.*

10.4–206 551.521.1:621.47:536.52

Brenden, Byron B.; Newkirk, Herbert W., Jr. and Woodcock, Sidney H., **A study of emperature measurement in a solar furnace.** *Solar Energy: the Journal of Solar Energy Science and Engineering*, Phoenix, 2(1):13–17, Jan. **1958.** fig., 34 refs., 9 eqs. **DWB**—A urvey indicates that thermocouples and two-color pyrometers can be used to measure ac- urately the temperature of a specimen being heated in a solar furnace. The thermocouples ound to be most satisfactory and accurate to $\pm\frac{3}{4}$ percent in the range room temperature to 100°C are chromelconstantan, chromel-alumel, useful in oxidizing atmospheres, Driver- Harris, No. 242 (Geminol P) vs. No. 33 (Geminol N), useful in neutral and reducing at- mospheres. The range 1100°C to 3500°C can be determined by means of a two-color py- rometer with an accuracy of better than ±10°C. Both instruments, if properly designed, ave been demonstrated to be independent of the emissivity of the specimen and the en- vironmental conditions existing in a solar furnace. In addition, the two-color pyrometer an be used in conjunction with a conventional brightness pyrometer to determine the effective missivity of the specimen in the spectral band passed by the brightness pyrometer. *Subject Headings:* **1. Solar furnace temperature measurements 2. Pyrometers.**—*Authors' abstract.*

10.4–207 551.521.1:621.47

Laszlo, Tibor S.; de Dufour, William F. and Erdell, Joseph, **A guiding system for solar urnaces.** *Solar Energy*, Phoenix, 2(1):18–20, Jan. **1958.** 3 figs., 3 refs. **DWB**—An electronic ystem has been developed to guide solar furnaces and instruments of similar axial arrangement n their motion. The driving motors are supplied with a basic current. To this is added lgebraically a correction current developed by a photosensing and amplifier system. This rrangement permits a precise, even following of the sun's apparent motion. The system is xceptionally free of "hunting." *Subject Heading:* **1. Solar furnace guiding system.**—*Authors' bstract.*

10.4–208 551.521.1:620.9

Tabor, H., **Solar energy research: program in the new Desert Research Institute in eersheba.** *Solar Energy*, Phoenix, 2(1):3–6, Jan. **1958.** table. **DWB**—Research in thermal rocesses for harnessing sunshine, leading to work on selective black surfaces of low emissivity, described. With the resultant low radiation losses, the convection losses become dominant, nd these have been reduced in a new collector by mounting the solar receiver horizontally ice downwards. A low-concentration stationary mirror directs the sunshine upwards. team for industrial use is the target, and a pilot plant installation is now being designed. ther problems being studied include new flat-plate collectors for water and air heating, a nall turbine operated by a heavy vapor, and heat storage. Solar air conditioning is being nsidered from two approaches, one being the use of absorption-type water chillers operated ith solar heat, the other using the Altenkirch system of designing a house as a cyclic absorption ehumidifier. *Subject Headings:* **1. Solar energy research 2. Solar energy utilization .Solar power.**—*Author's abstract.*

10.4–209 551.521.1:69.024.92:536.62

Vild, D. J. and Parmelee, G. V. (*both, ASHAE Res. Lab., Cleveland*), **Heat gain through ass skylight fenestrations.** *American Society of Heating and Air-Conditioning Engineers, ransactions*, 62:89–110, **1956.** 18 figs., 3 tables, 5 refs. **DWB** (P A512sw)—Weather nditions affect thermal behavior of skylights in an industrial or a school building as shown

by measurements made of received, convected and re-radiated energy on a test panel at the ASHAE Research Lab. in Cleveland. Four types of eight-controlling skylights and 3 sheet-glass skylights were used. The ASHAE solar calorimeter used in the tests is described and illustrated. Diffuse transmittance data for the glass skylights are given, along with other data obtained for general conditions and on specific days where weather conditions and solar angles, direct and diffuse radiation are specified. Sample calculations are shown in detail and elaborate graphical presentations of data obtained are included. *Subject Headings:* **1. Solar radiation through skylights 2. Solar calorimeters.**—*M.R.*

10.4–210 551.521.11:551.593.54

Roller, M. (*Vienna*), **Charakteristische Besonnungstypen der Ostalpenländer.** [Characteristic insolation types in East Alpine regions.] *Wetter und Leben*, Vienna, 9(6/9):96–99, **1957.** fig., table, 7 refs. **DLC**—Effective possible sunshine duration studies in Austria are reviewed. Data are now available for 153 stations for all elevations from 118 m (Andau) to 3106 m (Sonnblick) above sea level. Ten characteristic insolation types are established for the regions of the eastern Alps. These are: exposed high altitude frontiers; exposed localities with an almost fair horizon; hilly land; basins; south slopes; east slopes; east-west valleys; northeast-southwest valleys; northwest-southeast valleys; and north-south valleys. These types are described with the aid of tables giving data on mean monthly values of locally possible sunshine duration, percentage of astronomically possible sunshine duration, etc. The effect of horizon shadow and haze upon sunshine duration in the various types is discussed. *Subject Headings:* **1. Sunshine duration data 2. Horizon effects on sunshine 3. Haze effects on sunshine 4. Eastern Alps.**—*I.L.D.*

10.4–211 551.521.11/12(438.2)

*Mackiewicz, Maria, **Promieniowanie słoneczne w Raciborzu.** [The solar radiation at Racibórz.] *Przegląd Geofizyczny*, Warsaw, 2(1/2):3–13, **1957.** 4 figs., 8 tables, 4 refs. English summary p. 13. **DWB, DLC**—Results of detailed study of solar radiation at Racibórz carried out recently (1956) on the basis of observation data obtained at the Silesian Geophysical station at Racibórz for the period 1929–1941 by C. Mainka with a Michelson-Marten actinometer, are presented in a number of graphs and tables. *Subject Headings:* **1. Solar radiation data 2. Racibórz, Poland.**—*A.M.P.*

10.4–212 551.521.2:551.510.53:546.264

†Brooks, Douglas L. (*Operations Evaluation Group, M.I.T.*), **The distribution of carbon dioxide cooling in the lower stratosphere.** *Journal of Meteorology*, Boston, 15(2):210–219, April **1958.** 14 figs., 4 tables, 16 refs., 6 eqs. **DWB, DLC**—The distribution of radiational cooling due to carbon dioxide is computed for the stratosphere below 30 km in an effort to provide an insight into the role of radiation in the observed seasonal and latitudinal changes of temperature and flow. Laboratory results of Burch, Howard, and Williams for the absorption of the 15μ band are used as an empirical basis for the computations. When the results are combined with data on solar absorption of ozone, provided by Pressman, and other radiational factors are assumed negligible, carbon dioxide is found to determine the radiational rates of temperature change below about 40 to 60 mb. In addition, it determines the rates at all heights north of the boundary of polar night. Ozone heating dominates the pattern above 40 to 60 mb south of the polar night boundary. Cooling maxima are 1 to 1.2 K per day near the 60 mb level in spring and summer and the 30 mb level in fall and winter. Heating increases above this level and exceeds 3 to 4 K per day at the highest altitudes considered. In spite of this large solar heating of the ozone layer, the Arctic stratosphere below 30 km is in all seasons a region of net radiational deficit. However, ozone heating in the infrared is probably sufficient to create an excess in southerly latitudes for this layer. The entire stratosphere to 55 km is a region of net deficit in all seasons except summer as far south as 45 deg at least. Even in summer a deficit exists near the pole. In general, the circulation must supply heat to the Arctic stratosphere in all seasons, as well as maintain a temperature distribution showing large north-south gradients in the face of radiational effects tending to destroy these gradients. In fall and winter the temperature change gradients are such as to favor maximum local temperature gradients at the boundary of the polar night above the 20 mb level, a possible

ource for perturbations observed in this region. *Subject Headings:* **1. Radiational cooling 2. Carbon dioxide in stratosphere 3. Ozone absorption 4. Radiational temperature change.** —*Authors' abstract.*

TEMPERATURE

See also: **Temp. & surface inversions, Salt Lake** (Thompson, Dickson), 10.4–13; **Min. temp. freq., Alaska** (Lackey), 10.4–32; **Record low temps., So. Pole, Greenland, Siberia** (Zikeev), 10.4–36; **Record low temps., Antarctica** (Flowers, McCormick), 10.4–37; **Record low temps., South Pole** (Caskey, Flowers), 10.4–38; **Solar radiation eff. on plants** (Borisoglebskiĭ), 10.4–87; **Cold eff. on respiratory tract** (Koĭranskiĭ, Zaks), 10.4–101; **Temp. obs.** (Ichikawa, Nose), 10.4–103.

10.4–213 551.524.35:551.589(73)

§Jordan, Harold M. and Lowry, Dale A., **Late-season cold outbreak, June 24–27, 1958.** *Monthly Weather Review*, Wash., D. C., 86(6):237–243, June **1958.** 9 figs., 5 refs. **DWB, DLC**—June was an abnormally cold month for much of the central U. S. Elsewhere in this issue O'Connor (1) discusses in detail the monthly circulation and weather. The most severe of a series of cold outbreaks which contributed to the delay of summer weather occurred June 24 to 27. Many long-standing daily temperature records at numerous stations as far south as Texas tumbled to lower levels with this intrusion of Canadian air. Crops were generally retarded and a few small areas where temperatures dropped below freezing suffered actual crop damage. However, the surge occurred so late in the season that strong modifying influences served to temper the onerous effects that cold air earlier would have imposed upon man's activities. A review of the general synoptic features of the pertinent weather maps for this period, some noteworthy details of frontal reorganization, and some prognostic problems related to the temperature patterns are the main subjects of this article. *Subject Headings:* **1. Cold air outbreaks 2. Cool summer, 1958 3. Summer temperatures 4. United States.**—*Authors' abstract.*

10.4–214 551.509.311:551.524.35(54)

Kumar, S. and Bhullar, G. S. (*both, Met. Off., New Delhi*), **Unusual cold wave over Northwest India from April 13 to 23, 1955.** *Indian Journal of Meteorology and Geophysics*, Delhi, 7(1):88–91, Jan. **1956.** 13 figs. **DWB, DLC**—The cold wave that affected northwest India on April 13–23, 1955 was the worst in 20 yrs. The synoptic situation and temperature on April 11 are shown to be near normal. The situation on April 13 and 17th, and maximum and minimum temps. and anomalies on those days are shown on charts, and the course of relative humidity and maximum and minimum temp. at New Delhi and Jodhpur are shown on a graph for April 6–26, 1955. The temps. were 15° to 20°F below normal in extreme N.W. India, and −8° or more below normal over much of the area during the week of April 12–19. The only cold wave of such severity in April was in 1935. *Subject Headings:* **1. Cold waves 2. Northwest India.**—*M.R.*

10.4–215 551.524.37(42)

Manley, Gordon (*Bedford College, London*), **The great winter of 1740.** *Weather*, London, 13(1):11–17, Jan. **1958.** fig., 4 refs. **DWB**—In England, Jan. and Feb. 1740 were 10° to 12°F below normal, and March and April chilly; May was also extremely cold—the coldest in memory of man. It came after a long series of warm years and began with a severe easterly outbreak that killed many people. The year 1814 was the next coldest in 250 years of record. Many interesting facts about this (1740) year and other extreme years are recounted. *Subject Headings:* **1. Severe winters in England 2. England.**—*M.R.*

10.4–216 551.524.37:551.508.26:551.525.4

Stelzer, F. (*Vienna*), **Das "Auffrieren" von Bodenthermometern.** [Frost heaving of the soil thermometer.] *Wetter und Leben*, Vienna, 10(1/2):28–30, Jan. **1958.** 5 refs. **DLC**—Soil heaving by displacing the position of soil thermometers hinders the measurement of soil temperatures on bare soil, particularly in clay soils which, owing to their high moisture content,

have a high heaving capacity. The amount of heaving experienced by a soil thermometer is given by the empirical formula of HAMBURG:

$$A = 2 \times 0.09 \times \frac{We}{Wfk} \cdot w \cdot a$$

where A—amount of elevation, 2—factor of relative elevation during freezing and thawing, 0.09—increase in volume during freezing, We/Wfk—ratio of heat conductivity of earth and of a rigid body, w—water content of the soil and a—length of the rigid body perpendicular to the cooling surface. It is shown that values of thermometer elevation during soil heaving computed with this formula are too high for depths from 5 to 20 cm. Short stems are raised more than long ones. In sandy clay soil the author measured a rise of the soil amounting to 17 mm and of wooden stems of amounting to 28 mm during a winter. *Subject Headings:* **1. Frost heaving of thermometers 2. Soil thermometers.**—*I.L.D.*

10.4–217 551.524.4

*Buchinskiĭ, I. E., **O vertikal'nom temperaturnom gradiente na Ukraine.** [Vertical temperature gradient in the Ukraine.] *Kiev, Ukraine. Ukrainskiĭ Nauchno Issledovatel'skiĭ Gidrometeorologischeskiĭ Institut, Trudy*, 4:45–51, **1955.** 7 tables, 16 refs. Vertical distribution of temperature gradients in the Carpathian Mts., in the Carpathian foothills and over small elevations were investigated by comparing the actual observations of two very closely situated stations. The observations of 35 stations, represented as 56 pairs, were analyzed. The distances between each pair of stations ranged usually from 35 to 70 km. The accepted gradient of 0.5°C/100 m was found not to hold for the Ukraine where it varies considerably on account of its dependence upon the form of the terrain. The vertical temperature gradient varies annually attaining a maximum in summer and a minimum in winter. Accurate values of temperature gradients can be obtained by comparing observations of pairs of stations situated on homogeneous terrain, whose differences in elevation do not exceed 150 m. Data on the mean monthly values of temperature gradients are presented in tables. *Subject Headings:* **1. Vertical temperature distribution 2. Temperature gradient 3. Carpathians.**—*I.L.D.*

10.4–218 551.524.4:551.526.6:551.515.2

Fisher, Edwin L. (*Dept. of Met. and Oceanog., N. Y. Univ.*), **The exchange of energy between the sea and the atmosphere in relation to hurricane behavior.** *Journal of Meteorology*, Boston, 15(2):164–171, April **1958.** 4 figs., 11 refs., 4 eqs. **DWB, DLC**—A previous study having suggested a relationship between sea-surface temperatures and hurricane behavior it was felt that the mechanism producing this effect must be the eddy flux of energy from sea to air in the vicinity of a hurricane. This is investigated synoptically by means of the equations used by JACOBS and it is concluded that there is some evidence of a relationship. *Subject Headings:* **1. Energy exchange sea-atmosphere-hurricane relationships 2. Hurricane behavior.**—*Author's abstract.*

UPPER AIR TEMPERATURES

See also: **Atmos. and ionospheric models** (Kallmann), 10.4–159.

10.4–219 551.524.7:551.515.7(431.55)

Grasnick, Karl-Heinz, **Die Temperaturänderung der Troposphäre über Lindenberg in Antizyklonen nach Rechnung und Messung.** [Temperature changes in the troposphere over Lindenberg within anticyclones, according to observations and computations.] *Annalen der Meteorologie*, Hamburg, 8(3/4):98–107, **1957. DWB, DLC**—This investigation of temperature change as a result of radiation processes is based on two weather situations; namely, a summer situation in which a high lay over Denmark with extensions into central Germany and Poland and a fall situation characterized by a developing and dissolving high pressure bridge between France and Russia. In order to determine with accuracy the dependence of absorption of radiation by water vapor upon atmospheric pressure, the precipitable water in the atmosphere is corrected by the factor $K_c = P/P_0$. The following results were obtained: the 12-hour cooling

mounts to 1°C; at wind velocities less than 5 cm/sec, the measured and computed values requently coincide; the long wave radiation acts to smooth out gradient oscillations and nversions; the height of the thermal influence of the atmospheric ground layer depends sea- onally upon the insolation; as a result of convection and turbulence, the air temperature t 500 mb is, during constant weather situations, on the average of 1–2°C warmer during the ay than at night. *Subject Headings:* **1. Tropospheric temperature change in anticyclones . Radiative temperature 3. Lindenburg, Germany.**—*I.L.D.*

SOIL TEMPERATURE

See also: **Soil thermometers and frost heaving** (Stelzer), 10.4–216.

10.4–220 551.525.2:555.579.5

Umetani, H., **On the estimation of soil moisture content during the non-precipitation eriod.** *Journal of Meteorological Research*, Tokyo, 8(12):794–795, Jan. **1957.** 3 figs., table, refs., 4 eqs. In Japanese. **DWB, DLC**—Empirical relation between soil surface tem- erature and soil surface moisture content during nonprecipitation period is studied with data f 1947–1950 at Owada, Saitama Prefecture. An empirical equation is set and its exponential onstant is determined by the least square method. *Subject Headings:* **1. Soil temperature- noisture relationships 2. Owada, Japan.**—*J. Woo.*

WATER TEMPERATURE

See also: **Hurricane behavior & sea-atmos. relationships** (Fisher), 10.4–218.

10.4–221 551.513:551.526.8

Neumann, Heinz-Günter (*Met. Inst., Tech. Hochschule, Darmstadt*), **Zellmuster auf der Oberfläche eines Teiches.** [Cellular pattern on the surface of a pond.] *Beiträge zur Physik der Atmosphäre*, Frankfurt a.M., 30(4):246–253, **1958.** 9 figs., 4 refs. German, English and French summaries p. 246. **DLC**—On the morning of Jan. 30, 1956, cold continental air nvaded the Rhine-Main-plain, and it had been snowing since early morning. At noon, ellular patterns were seen on the snow-pulp covered surface of a pond in the city of Darmstadt, aving diameters from 2 to 6 ft. Some photos were taken. According to a suggestion of KOSCHMIEDER, the cellular patterns, the bottom of the pond, and its surroundings were meas- ired. The results and a description of the weather, during the formation of the patterns, re presented. It is presumed that the phenomenon was due to convection in the pond water. *Subject Headings:* **1. Cellular convection in ponds 2. Weather effects on ponds.**—*Author's bstract.*

10.4–222 551.511.33:551.526.8

Saur, J. F. T. and Anderson, E. R. (*both, U. S. Navy Electronics Lab., San Diego, Calif.*), **Heat budget of a body of water of varying volume.** *Limnology and Oceanography*, Baltimore, Md., 1(4):247–251, Oct. **1956.** fig., 10 eqs. **DLC**—When the heat budget is applied to determine the evaporation from a lake of varying volume, the water budget must be considered. Using the continuity of the system, a modified equation for evaporation from the heat budget as been developed. The modified equation has a term in the denominator that includes a ase temperature used in the calculations. This equation is flexible in use and permits mini- izing errors due to unknown quantities in the water budget. *Subject Headings:* **1. Heat alance of lakes 2. Lake circulation.**—*Authors' abstract.*

PRESSURE AND WIND

PRESSURE

See also: **Pressure pattern flying** (Polhemus), 10.4–83; **Pressure pattern flying** (Polson), 10.4–84; **Ageostrophic wind variations** (Kochanski), 10.4–133; **H-bomb effects on atmos. press.** (Yamamoto), 10.4–140; **Trough & ridge freq., N. Hemisphere** (Klein, Winston), 10.4–191; **Atmos. oscillations** (Rocard), 10.4–223; **Ice drift-wind relationships, Arctic Ocean** (Drogaĭtsev), 10.4–244.

10.4–223 551.543.5:551.509.3:551.515.8

Rocard, Y., **Sur certaines oscillations atmosphériques propres d'environ 7mm de période.** [Certain characteristic atmospheric oscillations with a period approaching 7 mm.] *Académie des Sciences, Paris, Comptes Rendus*, 246(19):2781–2784, May 12, **1958. DLC**—Some oscillations of atmospheric pressure, with very regular period, can be explained through the movements of an air mass having a temperature and a density different from those of the surrounding air. The measurement of the period makes it possible to compute the average value of the temperature gradient $\partial T/\partial Z$ on the height affected by the oscillation and, in some instances, to foresee the weather changes. In the lowlands, particularly, the oscillations of the atmospheric pressure must be connected with the arrival of a cold front or with a definite change appearing, first and foremost, in the high atmosphere and necessitating the re-arrangement of the whole of the layers situated underneath. *Subject Headings:* **1. Atmospheric oscillations 2. Temperature gradient.**—*A. V.*

10.4–224 551.547:551.509.22

van Loon, Harry (*Weather Bureau, Union of South Africa*), **A 700 mb mean map from the Southern Hemisphere, summer (January).** (In: Angola. Serviço Meteorologico, **Miscelanea geofísica.** Luanda, **1956.** p. 55–62. 2 figs., 3 tables, 6 refs. **DWB** (M(08) A592mi)—A statistical investigation was carried out which showed that it is possible to arrive at sufficiently accurate values for the 1000–700 mb thicknesses by extrapolation from sea-level data when using mean values for ten days and longer. A mean 700 mb map for Jan. from the Southern Hemisphere was therefore constructed on the basis of sea level mean pressure and temperature maps. Extrapolated values were compared with radiosonde values. The major features of the map are discussed, and a brief comparison is made between the hemispheres. *Subject Headings:* **1. Mean pressure charts 2. Upper air climatology 3. Synoptic climatology 4. Southern Hemisphere charts 5. Southern Hemisphere.**—*Author's abstract.*

10.4–225 551.547.2

Heastie, H. (*British Met. Off.*), **Average height of the standard isobaric surfaces over the temperate and tropical regions in July.** *Great Britain. Meteorological Research Committee, M.R.P.* 1066, Aug. 27, **1957.** 3 p. 2 refs., 12 charts. **DWB** (M(055) G786 m)—In a previous paper (*see* 8.11–193, Nov. 1957, *MAB*), the contours of the standard isobaric surfaces were mapped on a Mercator projection, over the area from 75°N to 60°S for the month of Jan. These contour charts are being prepared in the course of the revision of C. E. P. Brooks et al., **Upper winds over the world** (*see* 4E–186, May 1953, *MAB*), and are being presented as they are drawn for each month, with the object of making them quickly available to users, thereby avoiding the inevitable delay in publication. *Subject Heading:* **1. Standard isobaric surfaces.**—*Author's introduction.*

10.4–226 551.547.2:551.501.5:518.3

U. S. Office of Naval Operations, **Reduction of reported pressure to sea level.** Its *NAVAER* 50-1P-526, **1956?** 9 p. 5 figs. **DWB**—Nomograms are presented for reducing station pressures, or pressures reduced to some level other than sea level, to sea level. The formula is based on the rule followed by the U. S. W. B. of taking the mean of the "current" temperature and the temperature "12 hours ago" to use as an argument against the elevation of the station to determine an "R" value, which when used against the station pressure (on another nomogram) gives sea level pressure in mb. The nomograms are valid for 0–12,000 ft,

−4° to 40°C, and pressures of 1020 to 656 mb (1047–975 mb sea level). *Subject Headings:* **1. Pressure reduction 2. Nomograms.**—*M.R.*

WIND

See also: **Wind speed estimates at sea** (Brooks, C. F. & E. S.), 10.4–104; **Ageostrophic wind variations** (Kochanski), 10.4–133.

10.4–227 551.55:535.33(782)

*Ely, Robert P., Jr. (*A. F. Cambridge Res. Center*), **Spectral analysis of the u-component of wind velocity at three meters.** *Journal of Meteorology*, Boston, 15(2):196–201, April **1958.** 5 figs., 3 tables, 5 refs., 10 eqs. **DWB, DLC**—A broad-band spectral analysis has been carried out for 54 ten-minute observations of the *u* component of wind speed at a height of three meters. The observations were made with mean wind speeds ranging from 2 to 9 m per sec and under all solar heating conditions. The data were taken on a flat grassland in Nebraska. The method of analysis is given and the results are discussed. In addition to confirming previously observed features of the spectrum, it is observed that the influence of solar heating is responsible for about 39% of the total energy between the frequencies of 1/1200 and 1/2 cps. *Subject Headings:* **1. Spectral analysis of wind velocity 2. Wind components 3. Nebraska.**—*Author's abstract.*

GUSTINESS AND TURBULENCE

See also: **Micromet. turbulence** (Singer, Raynor), 10.4–12; **Dynamic met.** (Eliassen, Kleinschmidt), 10.4–19.

10.4–228 551.551(262.8)

Goptarev, N. P., **O nekotorykh kharakteristikakh poryvistosti vetra.** [Some characteristics of gustiness.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:45–49, May **1957.** 2 figs., 2 tables, 3 refs. **DWB**—V. S. Bol'shakov's conclusions (*Met. i Gid.*, No. 3, **1955**; *see* 7.11–102, Nov. 1956, *MAB*) regarding wind gustiness are considered erroneous. On the basis of extensive observations on wind gustiness carried out on the Caspian Sea, the author makes the following conclusions: (1) the distribution of gusts in a wind current closely approximates a Gaussian curve, (2) regardless of conditions and observation techniques, the magnitude of the coefficients of gustiness in different instances closely resemble one another and are considerably less than that expected from the equation

$$\frac{V_{max}}{V_{mean}} = K_{mean} = 1.2 + \frac{7.2}{V_{mean}}$$

and (3) that the relation between frequency (period) of gusts and mean velocity is not correct. *Subject Headings:* **1. Gustiness 2. Caspian Sea.**—*I.L.D.*

10.4–229 551.551:551.508.53:551.553.6

†Notess, Charles B., **A study of the nature of atmospheric turbulence based upon flight measurement of the gust velocity components.** Cornell Aeronautical Lab., Inc., Buffalo, New York. Contract AF 33(616)-2946, Report VC-991-F-1, April 23, **1957.** 130 p. 58 figs., 3 tables, 16 refs., 76 eqs. **DWB** (M51 C814st)—Power spectral densities of the three orthogonal gust velocity components were obtained by direct calculation from data obtained in flight. Twenty data runs, recorded in turbulent air, were analyzed to provide information concerning the character of turbulence. The data runs surveyed altitudes between 700 and 3500 ft above flat and hilly terrain, during varied weather conditions. The turbulence wave lengths considered extend from 88 to 3500 ft. A method for estimating the autocorrelation function of the spanwise gradients of gust velocity was checked by comparison with experimental results. The method is based on the assumption that the turbulence was symmetric about a vertical axis and on knowledge of the autocorrelation of the corresponding linear gust velocity components. The experimental results indicate that assumptions of stationarity and isotropy give only crude approximations for turbulence at low altitude. Significant

variations of intensity were found in intervals of 6 min to indicate apparent nonstationarities in the air mass. Cross-spectra between the various gust velocity components were also found to be significant which indicates that isotropy was not present. The significance of these results as they concern practical applications of turbulence data are discussed. *Subject Headings:* **1. Atmospheric turbulence 2. Air-borne gust recorders 3. Gust velocity analysis** —*Author's abstract.*

10.4–230 551.551:535.3

Saunders, K. D. (*Douglas Aircraft Co., Inc.*), **A power-spectrum equation for stationary random gusts, including a sample problem.** *Journal of the Aeronautical Sciences*, N. Y. 25(5):295–300, May **1958.** 8 figs., 2 tables, 14 refs., 23 eqs. **DLC**—A general power-spectrum equation for stationary random gusts is derived on the basis of a mathematical abstraction that models the probability-density distributions of observed meteorological data. The scale and intensity of turbulence are given in terms of the modes and moments of simple probability-density distributions for the magnitude, duration and occurrence. Statistical parameters are tabulated for use to altitudes of 50,000 ft. Extreme spectra are given for clear-sky and thunderstorm gusts. A sample problem is worked for expected incremental load factors at the c.g. of a swept-wing fighter in flight through low-level random gusts at Mach Number 0.86. *Subject Heading:* **1. Gust spectrum.**—*Author's abstract.*

10.4–231 551.551:551.501.5

Su, Tsung-shian (*Inst. of Geophysics and Met., Academia Sinica*), **The turbulence in the surface layer of the stratified atmosphere.** *Acta Meteorologica Sinica*, Peking, 29(2):73–82, May **1958.** 7 figs., 17 refs., 21 eqs. In Chinese; English summary p. 82. **DWB**—In this paper the turbulent exchange in the surface layer of the stable atmosphere is discussed. Firstly, taking the effect of thermal stratification on turbulence, we derived a new form of the function of Richardson's number from the energy balance equation of the turbulent atmosphere. Secondly, we further proposed a reasonable function, which describes the vertical distribution of elements in the stable atmospheric surface layer. Thirdly, we give some graphs which allow us to calculate accurately and quickly the turbulent characteristic values, such as turbulent austausch based on observed data. For comparison with others, some calculations based on observed data are furnished. It shows that our treatment is reasonable and our results are better than MONIN and OBUKHOV's results. *Subject Headings:* **1. Turbulent exchange in lower atmosphere 2. Graphical methods.**—*Author's abstract.*

10.4–232 551.551.5:629.136.1(73)

*Anderson, Albert D. (*Naval Research Lab.*), **Free-air turbulence.** *Journal of Meteorology*, Boston, 14(6):477–494, Dec. **1957.** 14 figs., 14 tables, 13 refs., eqs. **DWB, DLC**—Eighteen hundred seventy-seven layers of turbulence, measured between 3000–18,300 m at four widely separated locations in the U. S. during all seasons by a parachuted telemetering instrument, have been analyzed by reducing the data to punched cards with the corresponding meteorological data. The altitude distribution of the layers exhibited three relative maxima (7400, 11,000, and 14,400 m), and three relative minima (6200, 9500, and 12,800 m). The first maximum, due to fronts, is the strongest. The other two are associated with the jet stream and probably represent clear air turbulence. The trend is for turbulence to increase from 3000 to 7400 m, then to decrease slightly to 14,400 m, and then to decrease rapidly to 18,300 m. The average thickness of the layers was 239 m; 87% were less than 400 m thick. Most of this turbulence was indicated to be fairly persistent and moderate to heavy, having horizontal dimensions of at least 10 to 20 mi. This turbulence is below normal at the lowest freezing level. It is above normal at the base and top of well-marked tropospheric inversions, most of which are thought to be frontal inversions. No good correlation was found with the base and top of the tropopause. Correlations have been found between this turbulence and ranges of the following parameters: Richardson's number, vertical wind shear, lapse rate, wind speed and direction, temperature, and relative humidity. A theory of free-air turbulence, derived by analysis of the above-normal turbulence ranges for these parameters, has the following elements: 1) transitions occur in free-air turbulence flow, similar to transitions

ccurring in incompressible fluid flow; 2) transitions occur at certain values of Richardson's umber R; 3) the vertical wind shear term is the most important parameter in R governing he turbulent flow. From the theory, it follows that the critical value of R can be taken to be nity which means that the coefficients of turbulent diffusion for heat and momentum are qual in the free air. *Subject Headings:* **1. Free air turbulence 2. Turbulence measurements . Turbulence data 4. United States.**—*Author's abstract.*

HORIZONTAL DISTRIBUTION AND WIND VARIATIONS

See also: **Airport usability, Prestwick, Scotland** (Lenhard), 10.4–82; **Fire weather studies, Oregon & Wash.** (Cramer), 10.4–93; **Atmos. turbulence and air-borne gust recorders** (Notess), 10.4–229; **Wind profiles, Dairen, China** (Yang, Tseng), 10.4–236.

10.4–233 551.552:912(265)

McGary, James W. and Naito, Thomas M., **Wind atlas of the North Pacific.** *U. S. Fish nd Wildlife Service, Special Scientific Report—Fisheries*, No. 243, Sept. **1957.** 35 p. 53 harts, 2 tables, 12 refs. **DWB** (639.206 U583sp)—This atlas comprises a summary of average ind speeds in the Pacific north of 30°N lat., and was prepared with the hope that it would id the fishing industry in evaluating fishing conditions and potentialities in that region. he data were obtained from the current files of unpublished wind data maintained by the . S. Weather Bureau. They represent observations made over a 60-yr period by a great umber of ships traversing the area. For each month, with a few exceptions, there are 5 harts; the first 4 indicate the geographical variations of the observed wind speeds that were ≤ 20, ≤ 25, ≤ 30, and ≤ 35 kn, respectively. The fifth chart gives the maximum observed ind in Beaufort scale for each 5-degree square of latitude and longitude. *Subject Headings:* . **Wind charts 2. North Pacific.**—*Authors' abstract.*

10.4–234 551.552:551.553.6(52)

*U. S. Army Ballistic Missile Agency, Redstone Arsenal, Ala., **Wind distributions as a unction of altitude for Haneda Air Force Base, Tokyo, Japan (U).** Its *DA Technical Report*, No. 7–58, July 1, **1958.** "213 p." (each section repaged). numerous figs. and tables. **DWB** 551 U581wi)—This report contains the statistical distribution of wind as a function of altitude or Haneda Air Force Base, Tokyo, Japan. The observational data cover a period of five ears (1949–53) as compiled by the National Weather Records Center, Asheville, N. C., and urnished through the Climatic Center, Air Weather Service, U. S. Air Force. Seven types of requency distributions are presented with reference to the wind as a scalar quantity (one ounded distribution) and as a vector quantity in the common Cartesian coordinate system two unbounded distributions); in addition, both the zonal and the meridional components are eparated into their positive and negative partial populations, thus providing four bounded istributions. Tables and graphs are presented for the annual and monthly periods from umulative percentage frequency (polygons) for each of these distributions. *Subject Headings:* . **Wind distribution 2. Wind frequency data 3. Tokyo, Japan.**—*Authors' introduction.*

10.4–235 551.553(712.7)

Holtz, C. D., **The diurnal variation of surface wind speed at Rivers, Manitoba.** *Canada. Meteorological Branch, CIR-2996*, TEC-261, Local Forecast Study No. 32, Dec. 23, **1957.** p. 4 figs., 2 refs. **DWB, DLC**—In order to provide an aid to short range surface wind speed orecasting at Rivers, Manitoba, the hourly wind speed reports for the 12 yr period 1945–1958 ere analyzed. Graphs are presented giving percentage occurrence of surface wind speeds ≤ 10 mph in relation to local time and month; percentage occurrence for wind speeds ≤ 15 mph n relation to local time and months, percentage occurrence with time for a particular month nd a particular speed (10 and 15 mph) and the average surface wind speed. A definite time attern has been established for the occurrence of particular wind speeds which are required or paradrops. *Subject Headings:* **1. Wind speed data 2. Rivers, Manitoba, Canada.**—*I.L.D.*

VERTICAL DISTRIBUTION AND SPECIAL WINDS

See also: **Sukhovei eff. on agriculture** (Tsuberbiller, Belukhina), 10.4–88; **Synoptic case history studies, China, Eurasia** (Pan, Kao), 10.4–136.

10.4–236 551.554:551.552:539.6

Yang, Ta-cheng and Tseng, Kwang (*both, Peking Univ.*), **The influence of the surface' roughness upon the wind profile in the upper planetary boundary layer over Dairen.** *Acta Meteorologica Sinica*, Peking, 29(1):1–6, Feb. **1958.** 6 figs., 14 refs., 5 eqs. In Chinese; English summary p. 6. **DWB**—The wind data from free balloon at Dairen for the year 195 are grouped into four sets, namely: wind from sea at 11:00 and at 23:00h; wind from land a 11:00 and at 23:00h. By using the results obtained earlier by one of the authors, the calculate wind profile agrees with the observed wind distribution. Comparing the different distribution of the turbulent coefficient K with height for the four conditions, the influences of the stabilit and the surface's roughness on the wind profile are discussed. *Subject Headings:* **1. Win profiles 2. Wind distribution 3. Surface roughness effects on wind 4. Dairen, China.**—*Authors' abstract.*

10.4–237 551.555.1(673

Flohn, Hermann (*Deutscher Wetterdienst*), **Zur Kenntnis der äquatorialen Westwindzon über Angola.** [Information on the equatorial westerlies over Angola.] (In: Angola. Serviço Meteorológico, **Miscelanea geofisica.** Luanda, **1956.** p. 25–28, table, 6 refs. **DWB** (M(08 A592mi)—Pilot balloon data from Luanda (1948–52) are discussed. The vertical extensio of the equatorial westerlies, predominating throughout the year, is derived. *Subject Headings* **1. Equatorial westerlies 2. Angola.**—*Author's abstract.*

10.4–238 551.555.3(584.4

Babushkin, L. N., **O klimatichekoĭ kharakteristike letneĭ vozdushnoĭ zasukhi i sukhovee v khlopkovoĭ zone Uzbekistana.** [Climatic characteristics of atmospheric dryness an sukhovei during summer in the cotton region of Uzbekistan.] (In: Akademiia Nauk SSSR Institut Geografii, **Sukhovei ikh proiskhozhdenie i bor'ba s nimi.** Moscow, **1957.** p. 59–64. **DLC** (QC940.R9A6)—A theoretical discussion of the problem is presented, which leads to th conclusion that atmospheric dryness of summer weather in Uzbekistan, and dry winds blowin there sometimes, belong to the same category of weather phenomena. The dry winds ar considered to be a particular case of air dryness, aggravated by the presence of dry winds A study of meteorological data for a number of years enabled the author to present a pictur of how often the phenomena appears, as well as their duration in various parts of Uzbekistan The author discusses also the direction of dry winds; in the majority of cases, they coincid with the directions of prevailing winds. *Subject Headings:* **1. Sukhovei 2. Uzbekistan U.S.S.R.**—*A.M.P.*

10.4–239 551.555.3:551.506.3(477

Buchinskiĭ, I. E., **Vekovoĭ khod sukhoveev v Voroshilovgrade.** [The secular march o sukhovei in Voroshilovgrad.] *Meteorologiia i Gidrologiia*, Leningrad, 7:32–33, July **1956** 2 figs., table. **DWB, DLC**—Taking the criterion for a day of dry winds as meteorological conditions when at 13 o'clock the relative humidity is less than 30%, the air temperatur greater than 25°C, and wind velocity greater than 5 m/sec, the author analyzes the secula variation of these winds in Voroshilovgrad, where such winds are more frequent than else where in the Ukraine. Data are given on the number of days with sukhovei in Voroshilovgra for each year from 1838–1954; a ten year moving average of the number of days with sukhov is shown; and numerical data are given on the decadal frequency of dry winds for each mont from April to Oct. During the decade 1883–1893, the frequency of dry winds reached maximum; during the period 1910–1919, they reached a minimum. The annual variation o dry winds shows a maximum during the first 10 days of Aug., a second maximum during th second 10 days of May. June also shows a decline on the number of dry winds. *Subje Headings:* **1. Sukhovei 2. Secular wind variations 3. Voroshilovgrad, U.S.S.R.**—*I.L.D.*

10.4–240 551.535.3:551.58(476)

Fel'dman, Ia. I., **Opredelenie meteorologicheskogo kriteriia sukhoveia pri pomoshchi etoda kompleksnoĭ klimatologii.** [Determination of meteorological criteria of sukhovei y means of the method of complex climatology.] (In: Akademiia Nauk SSSR. Institut eografii, **Sukhovei ikh proiskhozhdenie i bor'ba s nimi.** Moscow, **1957.** p. 94–105. 2 figs., tables, 7 refs.) **DLC** (QC940.9A6)—A paper showing that the use of complex climatology pplied to daily meteorological data of 10 stations in the semi-desert, steppe and forest-steppe ones of European U.S.S.R. during May–Aug., 1946–1952, made it possible to carry out a atistical analysis of the relationship between weather and plant conditions. *Subject Headings:* **Complex climatology 2. Sukhovei 3. Steppe climates 4. Southeast European U.S.S.R.** —*A.M.P.*

10.4–241 551.555.3:551.577.38

Ivanov, V. K., **Usloviia vozniknoveniia i kharakter sukhoveev Zapadnoĭ Sibiri.** [Condi- ons leading to sukhovei and their characteristics in Western Siberia.] (In: Akademiia auk SSSR. Institut Geografii, **Sukhovei ikh proiskhozhdenie i bor'ba s nimi.** Moscow, **957.** p. 35–50. 10 figs., 3 tables, 35 refs.) **DLC** (QC940.R9A6)—In the great majority of ases, dry winds in Western Siberia occur in periods of prolonged and well-defined droughts, nd occur mostly in May and June in contrast to the European U.S.S.R. where dry winds ccur mainly in July. This distribution is the result of differences in geographical conditions. he main role in the formation of droughts belongs, not only to the warming up of air masses n the spot, but also to the entrance of warm continental and continental-tropical air from Middle and Central Asia. Drought often follows a dry fall in the preceding year, a cold winter ith little snow, an early cold spring. *Subject Headings:* **1. Sukhovei 2. Synoptic conditions or dry winds 3. Drought 4. Western Siberia.**—*A.M.P.*

10.4–242 551.555.3(548.7)

*Thambyahpillay, George, (*Dept. of Geog., Univ. of Cambridge*), **The kâchchān—föhn wind n Ceylon.** *Weather*, London, 13(4):107–114, April **1958.** 2 figs., 3 tables, 4 refs. **DWB**— he kâchchān is a dry föhn wind in northern and eastern Ceylon, occurring during the south- est monsoon when it is rainy on windward southwest side (June–Sept.). Ancient reservoirs, uilt over the past 2500 yrs to conserve the northeast monsoon (Dec.–Feb.) rainfall for use n the dry season, indicate little if any climatic change in 2 centuries or more. Isohyets of outhwest monsoon rainfall show the marked effect of the central ranges; tabular data for olombo, Nuwara Eliya, Dryatalawa and Batticaloa show contrasts in monthly mean tem- erature, daily range in temperature, relative humidity and rainfall. Wind duration fre- uencies, sea breeze and the diurnal maximum temperatures at Batticaloa and Dryatalawa re tabulated. The latter shows 17°–19°F difference between a plateau and a föhn affected ation during the kâchchān wind. This wind warms a little on descent to the eastern plateau nd even more on descent to the east coast, where it even counteracts the sea breeze. *Subject eadings:* **1. Föhn winds 2. Kâchchān (wind) 3. Ceylon.**—*M.R.*

WIND EFFECTS

See also: **Wind effects on atmos. pollution** (Holzworth, Blake), 10.4–149; **Artificial convection triggering by wind machines** (Spilger), 10.4–174; **Hurricane effects on ocean waves** (Pore), 10.4–196.

10.4–243 551.556.2:551.584.4

Casperson, G., **Mikroklimatische Studien im Bereich von Rohrmatten-Windschutzwänden.** Microclimatic studies near windbreaks of reed matting.] *Wetter und Leben*, Vienna, 9(6/9): –95, **1957.** fig., 6 tables, 20 refs. **DLC**—An experimental study on the effect of windbreaks ade out of reed mats upon the heat balance as compared with the heat balance of a wind posed surface. The experimental field 9×9 m in area was surrounded by a wall of reed ats 1.60 m high. Temperature was measured with ordinary mercury thermometers; tem- erature sums were measured by the method of Pollmann, Eichenberger and Hasler. Wind was measured with a cup anemometer. In front of the windbreak, the wind velocity

was reduced. On the lee side, it graduated in the middle of the protected square to 50% just before the second wall, to 12% of the wind velocity in the open—at the second wall it drops to zero. A comparison of wind velocities at 50, 100 and 150 cm above the surface in the open air, in the reed mat square, and in a corn field shows a decrease in wind velocities at all elevations in this order—open air, reed mat square and corn field. Mean soil temperatures at 2.5 and 10 cm were higher at all depths in the wind protected plot than in the open field (Feb., March). The daily variations were higher in the wind protected area than in the open field. The distribution of temperature at different points in the wind protected plot, temperature gradients and evaporation as measured with a Piche evaporimeter are discussed. *Subject Headings:* **1. Shelter belt effectiveness 2. Windbreaks 3. Microclimatological research.**—*I.L.D.*

10.4–244 551.311.184:551.556.8:551.542.

Drogaĭtsev, D. A., **Zony szhatiia i razrezheniia l'da v pole atmosfernogo davleniia.** [Zones of compressions and dispersion of ice in a field of atmospheric pressure.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 11:1332–1337, **1956.** 3 figs., 5 refs., 8 eqs. **DLC**—The relation between ice drift and surface and geostropic wind in the Arctic Ocean is discussed. By considering, on the basis of numerous observations, that the deviation of the advection of ice drift from the direction of the geostropic wind is approximately 10° to the right, and by assuming a constant coefficient of ice drift, the author calculates the divergence velocity of ice drift. By introducing limiting conditions expressing the fixity of the shores relative to the ice cover, it was found that the divergence velocity of the ice drift is a quantitative estimate of the compression and dispersion ice drift during stationary conditions. The formulae for calculating the divergence velocity of the wind ice drift, the compression and dispersion of ice are presented and their use in concrete cases is illustrated. *Subject Headings:* **1. Ice drift-wind relationships 2. Arctic Ocean.**—*I.L.D. and author's abstract.*

UPPER AIR WINDS

See also: **Upper air winds** (Alt, Germain), 10.4–79; **Upper air wind data, Africa** (Schmitt), 10.4–112; **E region drift variations with height** (Jones), 10.4–158; **Easterly jet stream and tropical analysis, Caribbean Region** (Alaka), 10.4–176; **Air masses and fronts** (Flohn), 10.4–177; **Easterly jet stream** (Koteswaram), 10.4–178; **Jet stream speed and cold air outbreaks, Far East** (Mohri), 10.4–180; **Circulation patterns and S. Hemisphere circulation** (Wright), 10.4–182; **Precipitation belts and radar winds, S.E. England** (Harper, Beimers), 10.4–264.

10.4–245 551.557.5:551.524.

Cunningham, N. W. (*A. & M. College of Texas*), **A study of thermal wind in the vicinity of a jet stream.** *Meteorological Society of Japan, Tokyo, 75th Anniversary Vol. of the Journal*, pub. Nov. **1957.** p. 165–172. 10 figs., 2 tables, 3 refs. **DWB, DLC**—Wind and temperature data from a specially instrumented B-29 aircraft, operating near 400 and 300 mb, are used to test the thermal wind equation in the vicinity of a middle-latitude jet stream. Analyses of the data at the two levels are presented with respect to both the small and large-scale distribution of wind and temperature. The geostrophic wind shear between the two levels is calculated for horizonal temperature gradient computed over varying distances, and these are compared with the vertical shear obtained from aircraft-measured winds at the mid-point of each interval over which the temperature gradient is measured. The flow patterns at the two levels are considered in determining the ageostrophic components of the wind due to curved flow, and these corrections are applied in the final comparisons of calculated and aircraft-measured shear. A method using averaged winds at the lower level of the layer suggests that this may be a more representative reference than "spot winds" for approximating the wind above when using the thermal wind relation. *Subject Headings:* **1. Thermal winds 2. Jet stream analysis 3. Temperature gradient.**—*Author's abstract.*

10.4–246 551.557.5(265

Serebreny, S. M. and Wiegman, E. J. (*both, Pan Amer. World Airways, San Francisco*) **The jet stream complex over the Pacific.** *Meteorological Society of Japan, Tokyo, 75th Anni*

ersary Vol. of the Journal, pub. Nov. **1957.** p. 199–214. 15 figs., 4 tables, 9 refs. **DWB, DLC**—The jet stream complex over the Pacific is comprised of multiple jet streams which orm, intensify and weaken in differing manner, depending upon the synoptic situation and rea. Regional differences within the Pacific are discussed. The axis of seasonal "strong" vinds is determined and compared to the mean position of the principal baroclinic zone Multiple jet stream systems are related to multiple baroclinic zones and characteristic tem- perature ranges of these zones are delineated and compared to values given for North America. Specific thermal and contour height ranges at the 500 mb level can be identified with each of he multiple jet stream systems. The distribution and incidence of "strong" wind velocities t the 500 mb level with certain 500 mb contour heights and temperatures is demonstrated or selected stations in the Pacific. Use of these thermal-contour height ranges as an aid in dentification, location and forecasting of the jet stream complex is emphasized. *Subject Headings:* **1. Jet stream analysis 2. Jet stream over Pacific 3. Pacific Ocean.**—*Authors' Abstract.*

VERTICAL MOTION

See also: **Vertical velocity gradient** (Kubota), 10.4–175; **Hurricane models** (Miller), 10.4–197; **Moisture exchange and vertical current effects** (Arrago), 10.4–248.

10.4–247 551.558.21(449)

†Bérenger, Maurice and Gerbier, N., **Les mouvements ondulatoires à St. Auban-sur-Durance (Basses-Alpes).** [Lee waves at St. Auban-on-Durance, Lower Alps.] *France. Météorologie Nationale, Monographies*, No. 4, Aug. **1957.** 107 p. figs., tables, 12 refs. **DWB**—This study is based on a series of measurements operated in the course of Jan. 1956 at St. Auban-on-Durance (Lower Alps), by means of radiosoundings, aircraft soundings, gliders, balanced balloons and radar. Each day of measurements is studied in detail. The authors point out the existence of lee waves and their importance for gliders and aircrafts. The undulatory motions develop when winds are blowing perpendicularly to the mountain ridge. The authors suggest other conclusions also: they are relative to the vertical wind distribution, to the wave length and to the amplitude of the waves, to the temperature distribution, to the turbulence and to the clouds. (For shorter article of same title, *see* 9.4–161, April 1958, *MAB.*) *Subject Headings:* **1. Lee waves 2. Gliding 3. St. Auban-on-Durance, France.** —*A.V.*

AQUEOUS VAPOR, HYDROMETEORS AND HYDROMETEOROLOGY

HUMIDITY

See also: **Vapor press. gradient** (Rao), 10.4–108; **Water vapor transport, E. China** (Hsü), 10.4–169.

10.4–248 551.571:551.511.33:551.558

Arrago, L. R., **Vliianie vertikal'nykh tokov na vlagoobmen.** [Influence of vertical currents on moisture exchange.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 71:129–144, **1957.** 8 figs., 11 refs., 88 eqs. **DWB** (M(055) U581tG)—A quantitative investigation of the effect of vertical currents, important with regard to their extent or absolute size, upon moisture exchange. The contents of this study include the solution of the equation of diffusion of water vapor for stationary cases, taking into account the vertical component of velocity and horizontal advection; the possible error arising if vertical currents are not included in the diffusion equation; the procedure and results of calculations for two limiting cases: when α=constant and when α=changes sign; the influence of vertical currents upon the distribution of moisture in the atmosphere and upon evaporation for α=constant; and the asymptotic method, by means of which it is possible to solve the equation of transport of water vapor for a body of water bounded in the direction of the wind along which a non-evaporating underlying surface is situated. *Subject Headings:* **1. Moisture exchange 2. Vertical current effects.**—*I.L.D.*

EVAPORATION AND EVAPOTRANSPIRATION

See also: **World evaporation charts** (Ivanov), 10.4–20; **Fog and sea water evaporation** (Matsubara, Okuda), 10.4–259; **Effective precip. and potential evapotranspiration, Shikoku** (Kotomi), 10.4–267; **Effective precip. and potential evapotranspiration, Fukuoka** (Kusakabe), 10.4–268.

10.4–249 551.573:551.578.4

Salazonov, V. V., **K voprosu ob isparenii s poverkhnosti snega v usloviiakh Iakutii** [Evaporation from the snow surface under conditions prevailing in Yakutia.] *Moscow Tsentral'nyĭ Institut Prognozov, Trudy*, No. 58:121–126, **1957.** fig., 2 tables, 11 refs. **DLC DWB**—A series of observations were made during the spring of 1950 and 1951 in Yakutia in order to determine the magnitude of evaporation from snow cover. Evaporation was measured by the weighing method, which involved the use of small uniform boxes filled with snow and placed within the natural snow cover. Evaporation at night is considerably less than by day. When the absolute humidity of the air is less than 6.1 mb evaporation of snow takes place, but not when the absolute humidity exceeds 6.1 mb. During snow melting, when the air temperature is equal to zero, the maximum vapor tension above the snow is 6.1 mb. With increasing air temperature, evaporation diminishes—about 1.5–2.0°C—condensation takes place. A formula expressing the relationship of daily evaporation from a snow surface to moisture deficit (d) and wind velocity is determined empirically, namely $E=0.20d^{0.94}$. Numerical data giving the evaporation observation and the computed relationship between daily evaporation, moisture deficit and wind velocity are presented. *Subject Headings:* **1. Evaporation from snow cover 2. Evaporation measurements 3. Yakut A.S.S.R.**—*I.L.D.*

10.4–250 551.573:551.579.1:581.1

Yamaoka, Yoshito (*Faculty of Eng., Yamaguchi Univ., Japan*), **Experimental studies on the relation between transpiration rate and meteorological elements.** *American Geophysical Union, Transactions*, 39(2):249–265, April **1958.** 31 figs., table, 8 eqs., bibliog. p. 264–265. **DWB, DLC**—Water loss caused by transpiration is significant, especially on a bright summer day. The utilization of precipitation as a water resource will be affected largely by transpiration. Thereupon, the investigation of the transpiration rate was carried out as a fundamental datum of water resources, using a wind tunnel which can maintain an meteorological condition. Various examinations on the potometer method were performed and the method was found satisfactory in our investigations. The transpiration rate obtained by the potometer agreed within ±2.4 percent with that of the potted plant. The following empirical formulas were obtained from the relation of the transpiration rate to radiation intensity and wind velocity for *Myrica rubra*:

$$T=T_0\pm v/(0.55\times10^{-1.37R}v+0.32\times10^{-2.35R})$$
$$T_0=(2.09R+1.67H_d+35.62R)$$

Also, the relations of the leaf temperature to transpiration rate and meteorological elements were studied. Some systematic relations were found. *Subject Headings:* **1. Transpiration rate 2. Water losses 3. Transpiration-radiation intensity relationships 4. Transpiration—wind velocity relationships.**—*Author's abstract.*

CONDENSATION

See also: **Icing of transmission lines, U.S.S.R.** (Muretov), 10.4–97; **Artificial cumulus clouds, Belgian Congo** (Dessens, H. & J.), 10.4–144; **Photographs of microclimatic effects, Harpenden** (Monteith), 10.4–289.

10.4–251 551.574.1:551.5

†aufm Kampe, H. J. and Weickmann, H. K. (*both, Signal Corps Engineering Lab.*), **Physics of clouds,** *Meteorological Monographs* (American Meteorological Society), 3(12–20):182–21 July **1957.** 27 figs. (incl. photos), table, bibliog. p. 221–225, 31 eqs. **DWB, DLC**—T review of the progress in physics of clouds covers primarily the literature during the peri

951–1955. Its contents comprise the following subjects: 1) Microphysics of clouds—the vater phase: condensation nuclei spectrum, formation of large condensation nuclei, composition f aerosols, sea salt nuclei, growth of a condensation nucleus to a cloud droplet, homogeneous ondensation of water drops, general theory of coalescence of cloud droplets, TELFORD's theory f coalescence, collection efficiency of drops, VIERHOUT's coalescence theory, droplet spectrum f water clouds water content and visibility in water clouds; 2) Microphysics of clouds—the ce phase: interaction of the cumulus clouds as a rising body of warm air with its environment; SCORER and LUDLAM's theory which compares the dynamical element of cumulus clouds o a bubble of buoyant air, cumulus downdrafts, the effect of wind shear, the significance of ntrainment, the thunderstorm, the hailstorm, the tornado; 3) Macrophysics of layer clouds: vater clouds, and cirrus clouds. *Subject Heading:* **1. Cloud physics.**—*I.L.D.*

10.4–252 551.574.1

Blanchard, D. C. and Spencer, A. T. (*both, Woods Hole Oceanog. Inst., Mass.*), **Condensation nuclei in the vicinity of the Island of Hawaii.** *Tellus*, Stockholm, 9(4):525–527, Nov. **1957.** refs. **DWB**—Condensation nucleus counts made in the maritime trade-wind air in the icinity of the island of Hawaii have been found to average from 140 to 500 nuclei cc^{-1}. The ddition of nuclei to the air by industrial processes on the island of Hawaii and their transport y land breezes and variable winds can produce a complete spatial distribution of the nuclei. *ubject Headings:* **1. Condensation nuclei count 2. Nuclei distribution 3. Hawaiian Islands.** —*Authors' abstract.*

10.4–253 551.574.1:551.578.41

Isono, K. (*Geophysical Inst., Tokyo Univ.*), **On the growth of ice-crystals in the air.** *Meteorological Society of Japan, Tokyo, 75th Anniversary Vol. of the Journal*, pub. Nov. **1957.** 31–37. 7 figs., 17 refs. **DWB, DLC**—The processes of ice crystal formation on nuclei ave been studied experimentally. Replicas of ice crystals formed by seedings of $AgNO_3$, MgO, AgI, etc. were examined under optical and electron microscopes. The mode of the rowth of ice crystal by sublimation depends not only on temperature and water vapor excess, ut also on condition of diffusion field of water vapor surrounding the crystal and impurities n air. The mode of ice crystal growth is briefly discussed. *Subject Headings:* **1. Ice crystal ormation 2. Ice crystal growth.**—*Author's abstract.*

10.4–254 551.574.1:551.578.11

Kirkaldy, J. S. (*McMaster Univ., Hamilton, Ont.*), **The time-dependent diffusion theory or condensation on spherical and plane surfaces.** *Canadian Journal of Physics*, Ottawa, 6(4):446–455, April **1958.** 9 refs., 56 eqs. **DWB, DLC**—The diffusion field and the temerature distribution are calculated for the surroundings of a pure solid or liquid phase at onstant temperature growing into an infinitely extended binary fluid phase of different ecific volume. The solutions for spherical condensates are applicable to the condensation om air of water vapor on ice crystals or water drops. It is demonstrated that the generally ccepted quasi-stationary diffusion theory for spherical drops leads fortuitously to the correct owth law. *Subject Headings:* **1. Condensation theory 2. Drop growth.**—*Author's abstract.*

10.4–255 551.574.1:551.577.1:551.464

Mukherjee, A. K. (*Met. Off., Jodhpur*), **Salinity in rain water.** *Indian Journal of Meteorogy and Geophysics*, Delhi, 7(1):84–87, Jan. **1956.** table, 5 refs., 7 eqs. **DWB, DLC**—The lts in the atmosphere may be removed by (1) serving as condensation nuclei, or (2) by being ashed out by rain. A mathematical basis for calculating the amount of salts dissolved or rried to the earth by rain is presented and examples of applications discussed. It is conuded that drizzle is more effective in precipitating salts and enriching the land thereby an is heavy rain (especially with nitrates and ammonium salts) because small drops capture ore salt than large drops, and because drizzle lasts longer than showers (the plot of nitrogen recipitated against time since the start of a rain is a straight line). *Subject Headings:* **1. Salts recipitated by rain 2. Salt content of precipitation 3. Saline nuclei.**—*M.R.*

10.4–256 551.574.1:546.17:541.45

Mukherjee, A. K. (*Met. Off., Jodhpur*), **Theoretical consideration on nitric acid as conn densation nucleus.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 9(1):91–92 Jan. **1958.** table, 7 refs. **DWB, DLC**—A consideration from a theoretical point of view c the manner in which oxides of nitrogen form condensation nuclei in nature, and the possibl physical properties of these nuclei. Since, like any gaseous substance reacting with wate vapor, nitric oxide and nitrogen peroxide give rise to droplets of the size of condensation nucle (10^{-7} to 10^{-5} cm in diameter), both nitrous and nitric acid should be present. The increas in vapor pressure due to the increased curvature of the minute nitric acid droplets is less i cases of concentrated solution, since nitric acid solution has lower surface tension than wate As a result of aging, nitric acid droplets not only come to uniform size but also to uniform concentration. It is also suggested that part of the acidity of rainwater is due to the nitri acid present in cloud particles. *Subject Headings:* **1. Nitric acid nuclei 2. Condensatio nuclei.**—*I.L.D.*

10.4–257 551.574.1:551.578.41:621.385.83

Nakaya, Ukichiro and Kumai, Motoi (*both, Hokkaido Univ., Sapporo, Japan*), **Electron microscope study of center nuclei of snow crystals, Pt. 3.** *Meteorological Society of Japan Tokyo, 75th Anniversary Vol. of the Journal*, pub. Nov. **1957.** p. 49–55. 24 figs., 3 tables 5 refs. **DWB, DLC**—Experimental work was carried out in an igloo, half way up Mt. Tokach 1030 m above sea level, in the central part of Hokkaido. One solid nucleus (center nucleus was observed at the center of snow crystals in 190 cases among 202 samples tested. Combinin with the former result obtained by Kumai, it was confirmed that almost all snow crystals hav detectable nuclei at the center. Electron-microdiffraction patterns were taken with respec to some of the samples. From these patterns and the shape of the nuclei, the material of th nuclei was estimated. Roughly speaking, soil particles occupy 60% of observed nuclei, se salt particles 20%, combustion product or carbon particles 10%, and 10% cannot be estimate *Subject Headings:* **1. Snow crystal nuclei 2. Electron microscope studies.**—*Authors' abstract*

FOG

See also: **Ice fog & droxtals, Alaska** (Thuman, Robinson), 10.4–31; **Artificial fog** (Bashkirova, Krasikov), 10.4–142.

10.4–258 551.575.1:551.588

Koenuma, K. (*Japan Met. Agency, Tokyo*), **On the formation of land fogs.** *Meteor logical Society of Japan, Tokyo, 75th Anniversary Vol. of the Journal*, pub. Nov. **1957.** p. 83–8 3 figs., 3 tables. **DWB, DLC**—Most frequently, fogs are formed as a result of cooling of th air in contact with the earth surface. Such cooling may be due to loss of heat by outgoin radiation from the ground, advection of warm air over a cold surface and adiabatic expansio of air, streaming up over sloping terrain. Fogs thus formed are called radiation fog, advectio fog and upslope fog respectively. Other fogs are also produced as a result of evaporatio from the water surface which is warmer than the air. They are evaporation fog, such a steam fog and rain fog. All of these kinds of fogs may be formed at any place, though a fo which is produced by a single process is rarely observed, and the majority of them result fro interwoven processes. However, the seasonal variation of the frequency of fog formatio shows a particular type, according to the topographic effect. This means that a certain kind o fog seems to be produced, related to a certain topographic feature. In this note, the autho intends to study what kind of fog is apt to form, according to each characteristic type o topography. *Subject Headings:* **1. Fog formation 2. Topographic influences.**—*Autho abstract.*

10.4–259 551.509.615:551.575.1:551.57

Matsubara, S. and Okuda, S. (*Okayama Univ.*), **On the size of artificial fog for the pr duction of salt from sea water.** *Journal of Agricultural Meteorology*, Tokyo, 10(1/2):63–6 Dec. **1954.** 2 figs., 5 tables, 5 refs., eqs. In Japanese, English summary p. 66. **DWB**—F the production of salt from sea water, evaporation of water from fogs artificially made of s

water falling through unsaturated air is one method to produce salt. Before adopting this method, it was necessary to determine the most effective drop size of fogs which are made by a sprayer, considering the evaporating efficiency and horizontal distance of flight by wind. We studied drop size by field observations and simple numerical calculations and conclude that the most effective drop diameter of fog is about 0.1–0.2 mm, when the height of jet of the sprayer is about 10 m for the wind velocity on the coast of Seto Inland Sea. *Subject Headings:* **1. Fog evaporation 2. Seawater evaporation.**—*From authors' abstract.*

CLOUDS

10.4–260 551.576.1:551.515.4:551.21

Komabayasi, M. (*Geophys. Inst., Tokyo Univ., Tokyo*), **The suppression of thunder cloud occurrence by frequent volcanic eruptions.** *Meteorological Society of Japan, Tokyo, 75th Anniversary Vol. of the Journal*, pub. Nov. **1957.** p. 25–30. 3 figs., 13 refs. **DWB, DLC**—It has been found statistically that the occurrence of thunder clouds in the neighboring area of the volcano Asama was significantly less frequent in summers when the volcano had frequent eruptions than in summers when the volcano was less active. The average frequency of thunder clouds in the former case has been about half of that in the latter case. Results of analysis on this fact suggest that frequent eruptions of the volcano have modified the nature of cumulonimbus and suppressed the occurrence of thunder and lightning through the effect of some cloud-physical mechanism induced by seeding of the volcanic dust particles. *Subject Headings:* **1. Cloud dissolution by volcanic eruptions 2. Volcanic eruption effects on thunderclouds 3. Asama Volcano, Japan.**—*Author's abstract.*

10.4–261 551.576.1:629.135.2:53.08

Pilié, Roland J. and Jiusto, James E. (*both, Cornell Aeronautical Lab. Inc.*), **A laboratory study of contrails.** *Journal of Meteorology*, Boston, 15(2):149–154, April **1958.** 6 figs., 6 refs., eq. **DWB, DLC**—Contrails were produced for laboratory study by burning aircraft fuels under controlled conditions of ambient temperature and humidity at pressure altitudes between 1000 and 300 mb. Observed critical formation temperatures differ from APPLEMAN's theoretical data in a manner similar to that obtained on project CLOUD TRAIL flights. Laboratory experiments with these trails proved that the initial phase of the condensed moisture is liquid and produced strong evidence that, contrary to general belief, the final phase is sometimes liquid. Additional evidence was obtained, indicating that APPLEMAN's criterion for a barely visible trail (0.004 g per m^3 of condensed moisture) is very nearly correct for ideal conditions of observation, such as used in the laboratory, but is probably small by an order of magnitude or more for adverse conditions. By modifying APPLEMAN's theory to allow for the production of a visible quantity of liquid water under adverse viewing conditions, agreement is reached with project CLOUD TRAIL data. Also presented is a simple interpretation of the theory which substantially reduces the labor required to compute critical temperatures for contrail formation. *Subject Headings:* **1. Artificial contrails 2. Laboratory experiments 3. Contrails.**—*Authors' abstract.*

10.4–262 551.576.12:778.35 551.593

Reed, Richard J. (*Univ. of Washington*), **Flying saucers over Mount Rainier.** *Weatherwise*, Boston, 11(2):43–45 65–66, April **1958.** 3 figs., 4 refs. **DWB, DLC**—The present flying saucer craze is said to have begun on June 24, 1947 when KENNETH ARNOLD of Boise, Idaho saw a chain of shiny flat circular objects near Mt. Rainier which was 20 or 25 mi away. Conditions at the time were (judging from historical maps) somewhat similar to those on Dec. 29, 1956 when JOHN SCAYLEA, a photographer for the **Seattle Times,** obtained a vivid photograph of a pair of clouds 5 and 10 mi downwind from Mt. Rainier (shown on front cover and map on inside of front cover). The orographic clouds are described in general and the details of this "telephone-like" pair of clouds interpreted in the light of theory and observations made at the ground and in the upper air at nearby stations. The cloud base was estimated as 19,000 ft, both by triangulation from photo and by condensation level calculations. The top was 32,000 ft, and the cloud was moving but not as fast as the wind. *Subject Headings:* **1. Orographic clouds 2. Flying saucers 3. Cloud photographs 4. Mt. Rainier, Wash.**—*M.R.*

PRECIPITATION

See also: **Rainfall statistics, Brazil** (Amaral, Mota), 10.4–109; **Forecast errors, U.S.S.R.** (Bachurina), 10.4–139; **Storm rainfall analysis, Midwest U. S.** (Bradbury), 10.4–185; **Cyclonic precip., Miss. Valley** (Newton), 10.4–190; **Dry winds, W. Siberia** (Ivanov), 10.4–241; **Precipitated salts by rain** (Mukherjee), 10.4–255; **Precip. analysis, New Zealand** (Depietri), 10.4–271.

10.4–263 551.577(213)

†Beckinsale, Robert P. (*Univ. of Oxford*), **Nature of tropical rainfall.** *Tropical Agriculture*, Trinidad, 34(2):76–98, April **1957.** 13 figs., 2 tables, 41 refs. **DWB**—The importance of the tropics with respect to rainfall lies not only in its vast extent but in the greater depth of the tropical troposphere compared with the extratropical troposphere (18 km:9 km). Also, the sun is always overhead and there is a preponderance of oceans. Ocean currents, differential heating of land and sea, relief and ground cover, are unique in the tropics. The annual rainfall regime with respect to latitude, and the seasonal and regional variations, the intensity, year-to-year variability, and causes (convective, orographic and cyclonic or frontal) are discussed and illustrated by schematic diagrams, tables, and statistical graphs based on data from various sectors of the tropics (Puerto Rico, Malaya, Brazil and East Africa). *Subject Heading:* **1. Tropical rainfall.**—*M.R.*

10.4–264 551.577:551.501.81:551.557(425.65)

Harper, W. G. and Beimers, J. G. D. (*both, Met. Office, East Hill, near Dunstable*), **The movement of precipitation belts as observed by radar.** *Royal Meteorological Society, Quarterly Journal*, London, 84(361):242–249, July **1958.** 5 figs., 2 tables, 2 refs. **Discussion** by J. M. Stagg et al. *Ibid.*, 85(363):68–69, Jan. **1959. DWB, DLC.** Also in: *Meteorological Magazine*, 87(1,031):157, May **1958. DWB**—The movement of 51 belts of precipitation of cold-front type over southeast England has been measured from radar records and compared with upper winds at each 50 mb level from 950 to 500 mb. The mean speed of the belts is found to be in close agreement with the mean wind component across the belts at the 700 mb level, with a correlation in excess of 0.9. Even at 650 and 750 mb, the correlation is significantly lower, while at 950 mb it is only 0.6. The same pattern of correlations and of wind components was found in 31 belts associated with occlusion situations, and no significant variation in correlation level was found despite subdivision of the material on the basis of the height ranges of the observed echoes. A simple forecasting rule is suggested, that "belts of precipitation of cold front type move with a speed equal to the component of the 700 mb wind across them." (For abstract on same article from another source, *see* 8.11–232, Nov. 1957, *MAB.*) *Subject Headings:* **1. Precipitation belts 2. Radar winds 3. Southeast England.**—*Authors' abstract.*

10.4–265 551.577(437.1)

Jílek, Josef, **Atmosférické srážky v Čechách (1876–1956).** [Precipitation in Bohemia, 1876–1956.] *Meteorologické Zpravy*, Prague, 10(5):133–134, **1957.** 2 tables. **DWB**—Average precipitation values for Bohemia (average of all stations) are tabulated for every month from Jan. 1876 to Sept. 1957. Monthly and annual normals are also given in terms of intervals containing precipitation amounts which occurred in 50% of all cases. *Subject Headings:* **1. Precipitation normals 2. Precipitation data 3. Czechoslovakia.**—*G.T.*

10.4–266 551.577:628.24

Keifer, Clint J. and Chu, Henry Hsien, **Synthetic storm pattern for drainage design.** *American Society of Civil Engineers. Hydraulics Div., Journal HY4* (ASCE Proceedings Vol. 83, Paper 1332), Aug. **1957.** 25 p. 12 figs., 2 tables, 4 refs., eqs. **DLC** (TC1.A39)—A graphical method is developed for determining a storm pattern (with particular application to Chicago) which may be used in the hydrograph method of sewer design. The principal factors accounted for are 1) volume of water falling within the maximum period, 2) amount of antecedent rainfall and 3) location of peak rainfall intensity. The synthetic rainfall calculated and graphically presented in this paper is essentially composed of the statistical average of these three characteristics. *Subject Headings:* **1. Storm sewer design 2. Rainfall intensities 3. Excessive rainfall.**—*G.T.*

10.4–267 551.577:551.573(52)

Kotomi, S., **Effective precipitation in Shikoku considered from the potential evapotranspiration.** *Japan. Meteorological Agency, Memoirs of Industrial Meteorology*, 21(2):105–111, **1958.** 6 figs., 3 tables, 5 refs. In Japanese; English summary p. 111. **DWB**—The object of this report is to describe the effective precipitation in Shikoku considered from the evapotranspiration. The annual amount of evapotranspiration is 900–950 mm for the level plains, 700–900 mm for the mountain areas of each prefecture. The value of the concentration of evapotranspiration is about 50%; in other words, half the annual amount of evapotranspiration occurs in three months of summer. Annual and monthly distribution of evapotranspiration has almost the same aspect as the mean temperature distribution. Effective precipitation is 200–500 mm in level plains and 500–800 mm in mountain areas of Kagawa Prefecture. Similarly, it is 500–850 mm and 850–1500 mm for Ehime, 500–850 mm and 850–2000 mm for Tokushima, 1500–2000 mm and 2000–3000 mm for Kochi Prefectures. In Aug. the value of effective precipitation is negative for the northern part of Shikoku, which means the lack of water in this area. For Kochi, the correlation between the amount of effective precipitation and actual precipitation in Sept. is 0.97, while for Tadotsu its value is 0.69 due to the lack of water in Aug. Then it is shown that the effective precipitation in the northern part of Shikoku in Sept. is not a function of actual precipitation alone. The index of humidity is 0.2–0.5 for Kagawa Prefecture, 0.5–1.2 for Ehime, 0.8–2.0 for Tokushima, 2.0–3.0 for Kochi—so Shikoku can be divided into four areas climatologically considered from this index. *Subject Headings:* **1. Effective precipitation 2. Evaporation-rainfall correlations 3. Potential evapotranspiration 4. Water budget calculations 5. Shikoku, Japan.**—*Author's abstract.*

10.4–268 551.577:551.573(52)

Kusakabe, M. (*Fukuoka District Met. Obs.*), **Effective precipitation at Fukuoka from the viewpoint of potential evapo-transpiration.** *Journal of Agricultural Meteorology*, Tokyo, 12(4):151–154, March **1957.** 2 figs., 5 tables, 4 refs. In Japanese; English summary p. 154. **DWB**—The author estimated the potential evapotranspiration from the observed air temperature, and calculated the water balance at Fukuoka. We can suppose that the amount of water surplus which was obtained above calculation is the amount of effective precipitation. Monthly amount of effective precipitation and fluctuation of effective precipitation (1890–1955) are shown in tables. The amount of effective precipitation is the function of the amount of actual precipitation, evapotranspiration and soil moisture storage. The relation between the amount of effective precipitation and actual precipitation is the most closely evident as shown in Table 3 and Fig. 1. When the monthly totals of precipitation and evapotranspiration of two months are the same, while their daily amounts are different, the monthly amount of effective precipitation should be different. But we should not greatly err if we assume the monthly calculated data as the actual amount of effective precipitation. The difference between the monthly data and the total of the daily data is shown in Table 4. Table 5 and Fig. 2 show the relation between monthly data and total of daily data. *Subject Headings:* **1. Effective precipitation 2. Potential evapotranspiration 3. Water budget calculations 4. Fukuoka, Japan.**—*From author's abstract.*

10.4–269 551.577:551.43

Pardé, M. (*Faculty of Sciences, Univ. of Grenoble, France*), **Sur les altitudes des précipitations maxima en haute montagne d'après les débits fluviaux.** [Altitudes of maximum precipitation in high mountains according to streamflow data.] *La Météorologie*, Paris, Ser. 4, No. 45/46:191–197, Jan./June **1957.** Table. French, English and German summaries p. 191. **DWB**—The author attempts to show that precipitation increases with altitude to >3000–3500 m in the Central Alps and to 4000–5000 m at 1000–2000 km from the sea, in spite of numerous estimates of the maximum precip. elevation being as low as 1500–2000 m, 1000–1500 m, or even 500–1000 m. Estimates are made on the basis of stream flow in small basins. The optimum altitude is lowest on seaward slopes unprotected by other ranges. Previous studies, dating back to 1885, are cited. *Subject Headings:* **1. Altitude effects on precipitation 2. Orographic effects on precipitation 3. Alps.**—*M.R.*

10.4–270 551.577:551.588.2

†Picko, Václav, **Příspěvek k problému závislosti srážek na poloze místa a jeho nadmořské výšce.** [Dependence of precipitation on location and height above sea level.] *Meteorologické Zpravy*, Prague, 10(4):99–108, **1957.** fig., 10 tables, 36 refs., eqs. **DWB**—On the basis of precipitation data for over 750 stations in Bohemia and Moravia, correlations between precipitation amount and elevation are calculated. Curves showing the variation of precipitation with height are presented for every month of the year. Regional variations of the correlation coefficients are discussed. The paper includes explanation of the statistical method and a comparison of precipitation normals for several stations, with the values derived from the precipitation-elevation relationships. *Subject Headings:* **1. Precipitation-altitude relationships 2. Topographic effects 3. Bohemia 4. Moravia.**—*G.T.*

10.4–271 551.577.1:551.577.33:551.583

†Depietri, Carlo, **Analisi periodale di una serie di indici pluviometrici relativa alla Nuova Zelanda, 1852–1947.** [Periodic analysis of a series of pluviometric indices for New Zealand, 1852–1947.] *Geofisica e Meteorologia*, Genoa, 4(6):105–108, Nov./Dec. **1956.** fig., 23 refs. **DWB.** Issued as: *Modena. Universita. Osservatorio Geofisico, Pubblicazioni*, No. 66, **1956.**—The criteria for the reality of periodicities in meteorology formulated by PULLI are stated. One of these criteria is that, for a climatic cycle to be real, it must be present everywhere on earth, which has been verified in localities where meteorological series have been subjected to periodic analyses; but it cannot be assumed *a priori* that this periodicity will hold in areas where no such analysis has been made. Periodic analysis with the method of VERCELLI applied to New Zealand precipitation data (1852–1947) has isolated periodic components of 27, 15.2, 10.5, 8.2, 5.4, 4.1, 2.8 and 2.2 years. These cycles are reproduced and characteristics are analyzed. It is concluded that the 10.5, 8.2 and 5.4 years correspond to climatic cycles extensively studied in other regions and indicate a universal phenomenon. *Subject Headings:* **1. Precipitation analysis 2. Precipitation cycles 3. New Zealand.**—*I.L.D.*

RAIN AND SNOW

See also: **Ice fog & droxtals, Alaska** (Thuman, Robinson), 10.4–31; **Project Jello & snow accumulation, Greenland** (Benson, Ragle), 10.4–34; **Snow temp. & snow physics studies, Greenland,** 10.4–35; **Snow surveys & snowfall meas.** (Bartishvili), 10.4–102; **Synoptic studies, Japan** (Seshimo, Aoki), 10.4–137; **Cloud seeding & thunderstorm suppression, U.S.S.R.** (Chuvaev), 10.4–143; **Atmos. pollution, Eng.** (Gorham), 10.4–148; **Evaporation from snow cover, Yakutia** (Salazonov), 10.4–249; **Ice crystal formation** (Isono), 10.4–253; **Condensation theory** (Kirkaldy), 10.4–254; **Snow crystal nuclei and electron microscope studies** (Nakaya, Kumai), 10.4–257; **Snow melt runoff, Progona Basin** (Zmieva, Podvishenskaia), 10.4–282.

10.4–272 551.578.1:551.579.

Hutchinson, Sir Joseph; Manning, H. L. and Farbrother, H. G. (*all, Empire Cotton Growing Corp., Namulonge, Uganda*), **On the characterization of tropical rainstorms in relation to runoff and percolation.** *Royal Meteorological Society, Quarterly Journal*, London, 84(361): 250–258, July **1958.** 6 figs., 7 tables, 3 refs. **DWB, DLC**—The statistical characterization of tropical rainstorms is considered. Linear relationships are demonstrated between log duration and rate, and between log amount and rate. The rate of rainfall when it reaches the ground is then considered, and it is shown that from the linear regression of amount of rain and rate, together with runoff data, percolation rates can be estimated. The consistency of estimates of percolation rate is demonstrated from data from Namulonge, Uganda, and from the Ozark Highlands in Arkansas. *Subject Headings:* **1. Rainfall-runoff relationships 2. Percolation 3. Namulonge, Uganda 4. Ozark Mountains, Ark.**—*Authors' abstract.*

10.4–273 551.578.1:551.511.32(265

Ogata, T. and Itakura, H., **On the periodic precipitation in winter season at the ocean station Extra.** *Journal of Meteorological Research*, Tokyo, 10(6):485–491, June **1958.** 7 figs., table, 3 refs., eqs. In Japanese; English summary p. 485. **DWB**—The authors examine the periodic precipitation in winter (Nov.–March) from 1949 to 1953 at the ocean station

xtra (39°N, 153°E). Principal results are as follows: (1) Abrupt fall of air temperature at xtra is accompanied by periodic precipitation, which is associated with the development of onsoon. (2) The precipitation occurs from the instability shower, which is caused by the nstable modification of cold monsoon air with its southward travel over the warm ocean. *ubject Headings:* 1. **Monsoon precipitation** 2. **North Pacific Ocean.**—*Authors' abstract.*

10.4–274 551.578.11:551.3.053

McIntyre, D. S. (*Scientific and Industrial Res. Org., Adelaide, S. Australia*), **Soil splash nd the formation of surface crusts by raindrop impact.** *Soil Science*, Baltimore, 85(5):261–66, May 1958. 6 figs., 8 refs. **DLC**—The mechanics of the splash process and the formation f surface crusts were investigated, using small-area containers and simulated rain. A few eld measurements were also made on soil splash. It was found that soil splash from a mall area is greater for soils of higher stability, and that decline in splash rate is due to crusting r sealing of the surface. The formation of surface crusts was found to be due mainly to ashing-in of fine particles and compaction of the immediate surface (0.1 mm) by raindrop mpact. Frequent changes in splash rate are attributed to removal of the skin seal by turulence in the water above it, followed by its formation once more; permeability values are resented as evidence of this. *Subject Headings:* 1. **Raindrop splash** 2. **Soil erosion.**—*Author's bstract.*

10.4–275 551.578.11:537.2

Schotland, R. M. (*New York Univ.*), **The distortion of raindrops by an electrical field.** *Veather Radar Conference, 6th, Cambridge, Mass., March 26–28, 1957, Proceedings*, pub. 1957. . 9–14. 3 figs., 8 refs. **DWB** (M01.81 R124pc)—An experimental study has been made of he distortion of raindrops by a uniform electrostatic field. The distortion, as measured by he ratio of the major diameter of the drop to the minor diameter of the drop, was found to be a unction of the product of the initial radius of the drop and the square of the electrostatic eld strength. *Subject Headings:* 1. **Raindrop distortion** 2. **Electrostatics.**—*Author's abstract.*

10.4–276 551.578.4(234.3)

Ambrosetti, Flavio, **Schneetage in den Niederungen des Alpensüdfusses.** [Snow days n the valleys of the foothills of the southern Alps.] *Schweizerische Naturforschende Gesellchaft, Verhandlungen*, 136:92–93, 1956. **DWB, DLC**—Snow days are defined as days with at east 0.3 mm precipitation consisting entirely or partly of snow. The snow days of Milan, Lugano and Muralto over the period 1900/01–1949/50 are examined. On the average Milan as 6.9, Lugano 10.4 and Muralto 10.0 snow days per winter. The mean deviation from the nean for Milan is 3.5 and for the others it is 1.2. Lugano and Muralto have the greatest requency of snow days in Jan.–Feb., Milan in Jan. In Milan all snow days occur during the eriod Nov.–April. In Muralto the first snowfall usually occurs in mid-December; in Lugano few days earlier and in Milan, Dec. 21/27. The mean days for the last snow days are: Milan—Feb. 18, Lugano—March 8, and Muralto—March 9. Other detailed data on snowfall nd snow days are given in the text. *Subject Headings:* 1. **Snow days** 2. **Snow frequencies** . **Milan, Italy** 4. **Muralto, Switzerland** 5. **Lugano, Switzerland.**—*I.L.D.*

10.4–277 551.578.41

†Bashkirova, G. M. and Pershina, T. A., **Nekotorye dannye nabliudenii za formami nezhinok.** [Some data from observations on the forms of snowflakes.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 57(119):19–35, 1956. 15 refs., 8 figs., 3 tables. **DLC.** - Trans. into English available from Associated Technical Services, P.O. Box 271, East Orange, New Jersey, as its ATS-15K22R.—The results of observations on snow flakes under atural conditions and the relationship between the shapes of snowflakes and meteorological onditions are discussed. Forms of snowflakes are determined principally by the temperature f clouds within which ice crystals arise and develop and upon the thickness of clouds from hich precipitation takes place. Snow flakes falling from clouds at low or medium elevation re plate-like (shaped primarily like stars or needles); those falling from thick rain clouds are olumnar, plate-like or a combination of both. Precipitation from high clouds which are not ery thick consists only of columnar flakes. Precipitation containing granular flakes falls

from clouds in which the raindrop phase exists simultaneously with the solid phase. TH temperature of the 300–500 m layer above the earth's surface does not influence the form o snow flakes. No relationship was observed between the form of snowflakes and the tem perature at the earth's surface at the time of snow fall. The literature on this problem reviewed, photographs of snowflakes are reproduced and numerical data are presented. *Subje Headings:* **1. Snow crystal forms 2. Snowflakes.**—*I.L.D.*

HYDROMETEOROLOGY

See also: **Hydrology forecasting seminars, Yugoslavia** (Ashford), 10.4–29; **Hydromet. conf.** (Zigun), 10.4–46; **Flood erosion, Crimea** (Aizenberg), 10.4–47; **Hydromet. res. bibliogs., Calif.** (Gleason), 10.4–66; **Water vapor transport, East China** (Hsü), 10.4–169; **Soil temp.-moisture relationships, Owada** (Umetani), 10.4–220; **Transpiration-radiation intensity relationships** (Yamaoka), 10.4–250; **Rainfall-runoff relationships, Namulonge and Ozark Mts.** (Hutchinson et al.), 10.4–272; **Photographs of microclimatic effects, Harpenden, Eng.** (Monteith), 10.4–289.

10.4–278 551.579(282.247) 551.48.01

Ogievskaia, V. A., **Primer postroeniia gidrografa r. Dnepr u Kieva po dannym o stok chastnykh basseĭnov.** [An example of the construction of a hydrograph for the Dniepe at Kiev from data on the runoff of individual basins.] *Kiev, Ukraine. Ukrainskiĭ Nauch Issledovatel'skiĭ Gidrometeorologischeskiĭ Institut, Trudy*, 4:101–108, **1955.** 4 figs., table, 8 ref **DLC**—An attempt is made to construct runoff hydrographs of the Dnieper River at Kie on the basis of the runoff of individual basins which play a fundamental role in the formatio of this runoff. The basin of the Dnieper to Kiev consists of four principle basins which diffe among themselves in snow cover and time of snow melt so that the individual ordinates tha are totalled are not homogeneous in phase. Two types of hydrographs were constructe It was established that the velocity of longitudinal flow V_k of discharges of individual hy drographs to Kiev must be taken for each year as a function of the observed maximum di charges of the Dnieper at Rechitza according to the curve $V_k=f(Q)$ maximum at Rechitz Hydrographs of the runoff of the Dnieper at Kiev constructed from individual basins, compute curves of volume of runoff and curves showing a comparison of computed forecasts and ob served runoff are presented. A satisfactory forecast of runoff at Kiev on the basis of hydr graphs from individual basins can be obtained; this is indicated by the data on errors of con puted forecast maximum discharges at Kiev. *Subject Headings:* **1. Runoff hydrograph 2. River runoff calculations 3. Dnieper River 4. Kiev, Ukrainian SSR.**—*I.L.D.*

10.4–279 551.579:551.4

Sabo, E. D., **Sklonovyĭ stok na Ergeniakh.** [Runoff on slopes in the Yergeni Mountains *Meteorologiia i Gidrologiia*, Leningrad, 9:35–37, **1957. DWB, DLC**—The results of a stud on the spring runoff on slopes carried out during 1952–54 in the Yergeni Mts. in Stalingra Oblast. Five runoff plots, each 25×200 m, with slopes from 0.013 to 0.019 were studie on one of the plots the spring slope runoff was investigated under natural conditions, on t others the snow cover was varied artificially. The weather conditions (rainfall, temperatur snow cover regime) during formation of snow cover (fall and winter), and preceding a accompanying the beginning of thaw, are described. Numerical data on the effect of increas water reserves in the snow cover upon spring slope runoff; the effect of increased density of t snow cover, as a result of smoothing it with a roller along the slope, upon the runoff (1952 and the effect of artificial channeling of the slope upon the runoff are presented. The effe of water reserves differs under different conditions, depending upon winter conditions in dep of snow cover which may delay or hasten the snow thaw. Increasing the density of the sn cover raises the slope runoff by 10.2%. Artificial channels increased the slope runoff by 11 and the flow coefficient by 19.7%. *Subject Headings:* **1. Slope runoff 2. Snow melt run 3. Yergeni Mountains, U.S.S.R.**—*I.L.D.*

10.4–280 551.579(75

U. S. Forest Service, Southeastern Forest Experiment Station, Asheville, N. C., **A gui to the Coweeta Hydrologic Laboratory.** [Unnumbered Report], Sept. **1957.** 40 p. 37 fi

ub. of the Lab., p. 39–40. **DWB** (M79 U5867g)—This report gives the basic information n the location, climate, vegetation, land use, soils, precipitation, stream flow, ground water, il moisture, and other weather or climate elements at the Coweeta Hydrologic Laboratory in utheastern N. Carolina and N. Georgia. The 4700 acre experimental basin was established 1934. Research has been conducted in 3 phases: 1) 1934–40 measurements were made of ater yield, quality, etc., from undisturbed watershed to establish a baseline; 2) from 1941–53 periments on effect of clearing (grazing, farming and logging) and on transpiration with arious covers were conducted and 3) from 1954 to date the rates of watershed restoration, e of water by vegetation, etc. were studied. Climatic data are included in the report along ith discussion and illustrations of results of experiment. *Subject Headings:* **1. Forest hy-rology 2. Hydrologic laboratories 3. Rain gage networks 4. Coweeta, N. C.**—*M.R.*

10.4–281 551.579.2:631.51(47)

Trushin, V. F., **Vliianie razlichnykh vidov vspashki na vesenniĭ stok vody.** [The effect of arious types of plowing on spring runoff.] *Meteorologiia i Gidrologiia*, Leningrad, No. 38–40, **1957.** 2 tables. **DLC, DWB**—The effects upon spring runoff of two different meth-ds of plowing, namely: 1) the ordinary method—smooth, both parallel and perpendicular to ie horizontal and 2) ridge plowing—parallel to the horizontal—were investigated on a state rm in the Tula Oblast. The results of a three-year period over which data were collected presented in a table) show that, at the start of snow melting, the snow accumulation on dge plowed fields was greater than on fields plowed according to other methods and that from dge plowed fields the spring runoff coefficient was less than from fields plowed by other ethods. *Subject Headings:* **1. Snow melt runoff 2. Plowing effect on runoff 3. Tula Oblast, .S.S.R.**—*I.L.D.*

10.4–282 551.579.2:551.578.46

Zmieva, E. S. and Podvishenskaia, N. Ia., **Raspredelenie i dinamika skhoda snezhnogo okrova v rechnom basseĭne.** [Distribution and dynamics of the disappearance of snow over in a river basin.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 54:43–61, **1957.** figs., 12 tables, 4 refs. **DWB, DLC**—Observations on the distribution of snow cover in field nd forest and the dynamics of disappearance of snow during the melting period were in-estigated at the runoff station, B. Sareevo, in the spring of 1955 and 1956. Also the amount melt water retained under snow on the surface of the Progona streams was studied. The recipitation, snow conditions, in field and forest during the fall and winter preceding the spring, uring which the snow melt was studied, are described in detail. With the aid of numerical ata, the authors discuss the water storage of the snow cover during the formation of the aximum distribution of the height of snow cover in forest and field, during the formation of aximum snow storage and at the beginning of snow melt; water storage and height of snow ver on the outskirts of the forest; snow melt computations in forest and field; mean water yer under snow and height of snow cover during the snow melt period of the spring of 1956 the Progona Basin, etc. In this region, the snow storage in the forest is usually 10% larger an that in the field chiefly because of differences in the periods of snow accumulation. The clusion in the calculations of snow in ravines (5–6% of area consisting of ravines) increases ly slightly the snow storage in the field (2–5 mm)—an amount not exceeding the limits of ror of snow storage determinations. Snow storage at the outskirts of forests, at a distance 20–30 m from the margins is always 30–40% higher than the average in the forest. In neral, the magnitude of water storage on the snow at the outskirts varies as a function of e prevailing wind direction, size of the fields in front of the forest and type of the forest ands. The distribution of snow storage in this region is characterized by greater homogeneity an the mean distribution for other basins of the European territories of the U.S.S.R. The rves of distribution of snow storage in the basin are not constant from year to year and are t similar for different basins. The water layer retained in a basin during the snow melt riod depends upon the soils of the given basin and their condition at the start of melting. ie amount of retained water depends upon infiltration. The layer of water accummulated der snow may attain magnitudes of 20–25% of the general snow storage. *Subject Headings:* **Snow melt runoff 2. Snow retention 3. Progona Basin, U.S.S.R.**—*I.L.D.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

See: **Indust. water requirements** (Abu-Lughod et al.), 10.4–95; **Dry winds & steppe climate, S.E. European U.S.S.R.** (Fel'dman), 10.4–240.

CLIMATIC ZONES

See: **Global radiation charts** (Bernhardt, Philipps), 10.4–8; **South Pole temp. extremes** (Flowers, McCormick), 10.4–37.

CLIMATE OF PARTICULAR PLACES

See also: **Bibliog. on German climate** (Zikeev), 10.4–64; **Marine atlases & clim. data,** 10.4–68; **Indust. site planning, Japan** (Kubo), 10.4–99.

10.4–283 63:551.582(79

Sternes, Gilbert L. (*State Climatologist, U. S. W. G., Portland, Oreg.*), **Climatologic records and Oregon agriculture.** *U. S. Weather Bureau, Weekly Weather and Crop Bulletin* 43(34):7–8, Aug. 20, **1956.** fig., 2 refs. **DWB, DLC, DA**—Oregon has temperatures we below freezing every month and some high water-table levels. In its central plateau, there ar stretches of fertile but semidesert land with little rainfall. During the blossom or setting-o stage of prunes in Oregon, a temperature of 31°F will cause great damage. The use of climat logical records in analyzing and planning of agriculture will be of greatest benefit to the hort culturist. *Subject Headings:* **1. Climate of Oregon 2. Agricultural climatology 3. Oregon U. S.**—*N.N.*

10.4–284 551.582.1(72

†Alexander, Charles S., **Geography of Margarita and adjacent islands, Venezuela.** *Cal fornia. Univ., University of California Publications in Geography,* 12(2):85–193, **1958.** 1 plates, 10 figs., tables, bibliog. p. 182–186. **DWB** (918.7 A375ge)—Ch. 2 of this standar geographical monograph covers the climate and weather of Margarita Island based on pre cipitation records at La Asunción (1921–40) which lies 20 mi off Venezuela at the eastern en of the arid zone of the southern edge of the Caribbean. Rainfall drops off from Trinida westward to about ¼ at a distance of 200 mi from Trinidad. These islands that hug the coas of S. America have a winter maximum of precipitation from troughs which break up the trade —whereas on the continent there is a summer maximum. The driest season is spring and earl summer. Causes are treated and examples of the seasons 1950–52 cited. Histograms sho relative seasonal regimes at northern and southern stations in the area. Convective activit is much stronger inland and on the larger islands, but does not operate on these small islan in the prevailing easterlies. *Subject Headings:* **1. Climate of Margarita Island, Venezue 2. Southern Caribbean 3. Margarita Island.**—*M.R.*

10.4–285 551.582.2(2

Arakawa, H., (*Met. Res. Inst., Tokyo, Japan*), **Percentage frequency of several weath elements in the NW-Pacific.** *Pacific Science Congress, 8th, Quezon City, Philippines, No* 1953, *Proceedings,* Vol. IIA, pub. **1956.** p. 1137–1144, 6 figs., 4 refs. **DWB**—From availab meteorological data gathered by the Japanese army and navy during World War II, the auth publishes data on the seasonal variation of sea surface visibility (Western Pacific), dai frequency of squalls and percentage frequency distribution of weather classified accordi to eight types. Marine charts with data plotted are reproduced. *Subject Headings:* **1. Vis bility at sea 2. Climate of Pacific 3. Squall frequencies 4. Marine climatic charts 5. Nort west Pacific.**—*I.L.D.*

CLIMATIC CHANGES

10.4–286 551.583:553.62

†Rex, Robert W. and Goldberg, Edward D., **Quartz contents of pelagic sediments of the acific Ocean.** *Tellus*, Stockholm, 10(1):153–159, Feb. **1958.** 5 figs., table, 18 refs. **DWB,)LC**—The quartz contents of pelagic clays from the eastern Pacific Ocean show a marked ititudinal dependence with a maximum around 30°N. Present evidence indicates that the uartz is mainly transported to the deposits through the atmosphere and that the observed istribution is probably related to the latitudinal values of the atmospheric wind fluxes and xposed arid land areas. A number of sediments display a distinct change in quartz content ith depth. In all cases there is a marked decrease going from the recent to the older strata. t is suggested that the changes indicate a major climatic change that occurred sometime during he Late Tertiary. *Subject Headings:* **1. Climatic changes 2. Paleoclimatology.**—*Authors' bstract.*

10.4–287 551.583.15:598.4(262)

Karapiperis, Photios P., **I giorni alcioni e la loro favola.** [Halcyon days and their story.] *Geofisica e Meteorologia*, Genoa, 5(5/6):75, Sept./Oct. **1957. DWB**—During the winter the Mediterranean is sometimes dominated by a cold air mass which brings to Greece good weather, ermed halcyon days. They are characterized by much sunshine, relatively high temperature nd low humidity. They coincide with the days during which the many-colored bird, the alcyon, lays its eggs close to the sea and that is from the end of Dec. to the middle of Feb. he halcyon days are attributed to the love story of Halcyon and Ceyx. An outline of the tory is presented. *Subject Headings:* **1. Halcyon days 2. Singularities 3. Meteorology in iterature 4. Mediterranean.**—*I.L.D.*

10.4–288 551.583.3:581.9

Potzger, John E. and Courtemanche, A., **Pollen study in the Gatineau Valley, Quebec.** *Montreal, Canada. Université. Service de Biogéographie, Bulletin*, No. 17, June **1957.**—Reprinted from *Butler University Botanical Studies*, 13(1):12–23, **1956.** 4 figs., 5 tables.—Pollen frequencies in the deposits of five bogs covering a radius of about 50 mi in the Gatineau Valley of Quebec were determined by conventional methods of pollen analysis. It is concluded hat the Gatineau Valley was one of the most important routes for plant migration during arly post-glacial times. An initial warm period is suggested by highest abundance of oak n the first or second foot-level and pine forest cover with very low spruce fir. Cooling climate ollowed soon, marked by a decided increase in abundance of spruce. Succession is similar t all five bogs. Pine (low oak peak) to pine-spruce, to Jack-pine, while spruce and fir ecreased to negligible representation, to white-red pine with minor hemlock peak, to pine-pruce-fir-birch which suggests cooling climate during the recent past. The Gatineau Valley pparently differs climatically from all of southern Quebec and the Mont Tremblant Park egion, which can not be attributed to latitude alone. *Subject Headings:* **1. Pollen analysis . Plant migrations 3. Gatineau Valley, Canada.**—*Authors' abstract.*

MICROCLIMATOLOGY

See also: **Clim. of Brookhaven Nat. Lab., N. Y.** (Singer, Raynor), 10.4–12; **Ocean-atmos. interaction, Japan** (Takahashi), 10.4–69; **Potato field microclimat.** (Abe, Takahashi), 10.4–85; **Microclimat. obs. & instruments** (Glaser et al.), 10.4–117; **Shelter belt effectiveness** (Casperson), 10.4–243.

10.4–289 551.584.34:551.579.2:551.574.41

Monteith, J. L. (*Rothamsted Experimental Station, Harpenden, Herts*). **Visible microlimate.** *Weather*, London, 13(4):121–124, April **1958.** 4 figs., 2 refs. **DWB**—Photograph f snow melting patterns on flagstone sidewalk at Harpenden, Herts, Dec. 24, 1956 shows unven thermal conductivity resulting in complete melting on the stones and little melting on he grassy cracks where more air is entrapped and conductivity much reduced. A photograph f the outside of a coal shed door shows pattern of dew deposit where the interior cross beams

presented a thick insulating surface, and no dew where the plain wooden door allowed more heat conduction from warmer interior of shed. Finally, photographs of dew on tall and short grass give a false microclimatic picture, for even though the dew is equally distributed, the optical effects make it appear to be heavier on the shorter grass. *Subject Headings:* **1. Photographs of microclimatic effects 2. Snow melting on stones 3. Dew on boards 4. Harpenden, Herts, Eng.**—*M.R.*

10.4–290 551.584.3

Gol'tsberg, I. A., **Izuchenie mikroklimata Kazakhstanskogo melkosopochnika.** [Study of the microclimate of the Kazakhstan hillocks.] *Meteorologiia i Gidrologiia*, Leningrad, No. 3:25–33, March **1957.** 4 figs., 6 tables, ref. **DWB, DLC**—The results of a field study of the frost and heat regime of sloping fields of different exposure in the mound relief of Kazakhstan with particular reference to the cultivation of summer wheat. Meteorological measurements were made on a 24-hr basis for 10–12 days at a time. Radiational balance and its components were measured, gradient observations of air temperature, atmospheric humidity and wind velocity were made at three points to a height of 15 m, soil temperature and soil moisture were measured, microaerological observations were taken to a height of 200–300 m and phenological data were collected. Data are presented on direct solar radiation at 53°N lat. on cloudfree days on southern and northern slopes with a steepness of 10° expressed as percent of radiation on a flat surface, mean differences in temperature of the southern slopes and top on cloudfree nights during a downslope wind and in its absence, on the maximum height of plants and the duration of the sowing-waxy period, the daily variation of air temperature under conditions on different terrain, characteristics of the frost free period in the atmosphere (end and beginning near lakes, flat localities, etc.) and on the frost free period in the air and at the grass level for different crops; graphs illustrate the downslope wind and distribution of temperature and relative humidity on slopes during nocturnal inversions. Maps showing the mean duration of the frost free period in days for the Aryk-Balykskii District and Kokchetav District and for individual collective farms are presented. *Subject Headings:* **1. Slope microclimatology 2. Kazakh SSR.**—*I.L.D.*

CLIMATIC CLASSIFICATION

See also: **Climatic analogs, Canal Zone** (Chambers, Blaut), 10.4–9; **Climatic analogs, U.S.S.R., Alaska, Canada** (Falkowski), 10.4–10; **Climatic regions, Czechoslovakia** (Nosek), 10.4–50.

10.4–291 551.585(437)

Konček, M. and Petrovič, Š., **Klimatické oblasti Československa.** [Climatic regions of Czechoslovakia.] *Meteorologické Zprávy*, Prague, 10(5):113–119, **1957.** fig., 2 tables, eqs. Russian and German summaries p. 113–114. **DWB**—A climatic map of Czechoslovakia was prepared by a committee after careful consideration of the problems involved. The map is presented and explained in this paper. The country was divided into three thermal regions and each of these was sub-divided by means of KONČEK's moisture index. Further subdivisions were made on the basis of sunshine duration, winter temperature conditions and altitude, giving a total of 19 regional climatic types. *Subject Headings:* **1. Climatic regions 2. Konček's moisture index 3. Czechoslovakia.**—*G.T.*

10.4–292 551.585(66)

Thompson, Will F., **Analogs of Canal Zone climate in West Central Africa.** *U. S. Quartermaster Research and Engineering Center. Environmental Protection Research Div., Technical Report*, EP-93, July **1958.** 22 p. 15 figs. (in color, fold.), 9 tables, 11 refs. **DWB** (M86 U585t)—The results of climatic testing in the Canal Zone may be applied with considerable confidence to much of the northern shore of the Gulf of Guinea. The climate of the coast is closely analogous to that of either the Atlantic or Pacific side of the Canal Zone except for the western part of the Bight of Benin. Close analogy to Cristobal—representing the wetter, windward, Atlantic side of the Canal Zone—is found in the wetter parts of the study area at the head of the Bight of Biafra and seaward of the Guinea Highlands. Close analogy to

dalboa Heights—representing the drier, leeward, Pacific side of the Canal Zone—occurs on he east side of the Guinea Highlands, on the coast between the Guinea Highlands and the est side of the Bight of Benin, on the eastern shore of the Bight of Benin, on the upper Niger elta, and on the southern and eastern sides of the Cameroons-Gabon plateau. Analogy with he various single elements mapped in this study is generally coastal in distribution, extending orth in some instances to cover the Sudan. The Atlantic coast of the Sahara and certain aharan uplands are analogous only for temperature of the warmest month; otherwise, the ahara is not analogous. *Subject Headings:* **1. Climatic analogs 2. West Africa 3. Canal one.**—*Author's abstract.*

BIOCLIMATOLOGY

See also: **Clothing, Arctic** (Dusek), 10.4–33; **Bioclimat. symposia** (Buettner), 10.4–49; **Space travel and biomet.** (Affronti), 10.4–78; **Wheat cultivation** (Baldwin), 10.4–86; **Solar radiation effect on plants** (Borisoglebskiĭ), 10.4–87; **Cotton diseases, Israel** (Yathom), 10.4–90; **Med. met. conf.** (Knepple), 10.4–100; **Cold effects on respiratory tracts, U.S.S.R.** (Kolranskiĭ, Zaks), 10.4–101.

10.4–293 551.586:380.8:796.93 551.509.22

Kmicikiewicz, Eugeniusz, **Z dziejów powstania I rozwoju służby meteorologicznej dla obsługi turystyki.** [Contribution to the history of the formation and development of meteorology in the tourist service.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 8(3/4):265–270, **1955.** Title-page in Polish and French. **DWB, DLC**—Geographers and climatologists were among the first to initiate and build up close cooperation between meteorology and tourism. This association was especially important in regard to winter tourism in general, and ski sports in particular. The author tells the story of the development of winter weather and snow condition forecasting, as well as the methods and publications used to disseminate this information and present it to the public. This program was initiated and carried out under the supervision of the former director of the Department of Meteorology and Climatology of Krakow University, W. MILATA, who died in Dec. 1954. *Subject Headings:* **1. Tourist climatology 2. Skiing 3. Winter weather forecasting 4. Poland.**—*A.M.P.*

10.4–294 551.586:612.5

Zenker, Helmut, **Ein Beitrag zum Problem Tagesrhythmus der Körpertemperatur und Wetter.** [A contribution to the problem of the daily rhythm of body temperature and weather.] *Angewandte Meteorologie*, Berlin, 3(4):125–127, June **1958.** fig., 5 refs. **DLC**—The author analyzed the deviations of the daily rhythm of body temperature from the mean rhythm in two patients suffering from pulmonary tuberculosis, one of whom was extremely weather sensitive. The mean daily curve of body temperature for the period 0700–2100 (six fixed readings) was constructed for each patient. The dominant weather phase of each day was classified according to UNGEHEUER's method of weather analysis. The total deviations of body temperatures from the mean curve for each day were plotted on graphs, a function of individual weather phases; curves of positive deviations, of the difference of positive and negative deviations, and of the sum of positive and negative deviations were considered for each patient. The different responses of the two patients were analyzed statistically and difference in respect to the increase of body temperature above the mean daily rhythm observed in each patient between good weather and the onset of weather change with warm air aloft was found to be significant in the weather sensitive patient. *Subject Headings:* **1. Body temperature 2. Weather sensitivity.**—*I.L.D.*

10.4–295 551.586:616.1

Kamiyama, K. (*Met. Res. Inst.*); Yamaguchi, Y.; Nashimoto, I., Furuhashi, M.; Suzuki, S. and Kashimura, A., (*all, Tokyo Dental University*), **On effects of environment condition on vasomotor reflex: plethysmograph and insulin stress.** *Papers in Meteorology and Geophysics*, Tokyo, 6(3/4):285–290, Jan. **1956.** 5 figs. (incl. photos), 8 refs. **DWB**—A new sensitive piezo-plethysmograph, the transducer of which was made of rochell salt crystal, was devised. It is the purpose of this paper to describe the mechanism of the plethysmograph and to point out some of the fundamental aspects of applying the plethysmograph to several

clinical problems. Spontaneous gangrene disease reaction to insulin stress will be presented in detail. *Subject Headings:* **1. Plethysmographs 2. Environmental effects on vasomotor reflexes.**—*Authors' abstract.*

UPPER AIR CLIMATOLOGY

10.4–296 551.587(47)(09)

Golyshev, G. I., **Uspekhi sovetskoĭ aerologii.** [Progress of Soviet aerology.] *Meteorologiia i Gidrologiia*, Leningrad, No. 11:26–31, **1957. DWB, DLC**—The history of Russian aerology during the 19th century is reviewed, particularly the work of M. M. POMORTZEV who in 1894 organized an International Aerological Meeting. Aerological observations were resumed after the revolution when the Pavolov Aerological Observatory and the Moscow Aerological Observatory began pilot balloon and airplane observations. In 1929, P. A. MOLCHANOV completed the first radiosonde and on Jan. 30, 1930 the first successful ascent was made. The first flight into the stratosphere with a balloon was made Sept. 30, 1933. By the end of 1937 the aerological network of the U.S.S.R. had 118 pibal observation points and 24 temperature sounding stations. During the period 1930–1941 studies were carried out on airplane icing, transformation of air masses and the origin of cosmic showers; and in 1941 the Central Aerological Observatory (station Dolgopeudnaia) was established. In 1948 the aerological network comprised 420 pibal stations, 81 temperature sounding stations and 30 radar stations. Extensive research is being carried out on the physics of clouds and precipitation, on the use of radar techniques to study the structure of the atmosphere, transformation of air masses, large scale atmospheric turbulence, optical properties of the free atmosphere and on the thickness of the stratosphere, with the aid of special rockets. In 1949 the first automatic balloon ascent was made. At present there are more than 150 radiosonde stations. The sounding height is now 22,100 m throughout the entire network. The names of the various individuals engaged in aerological research and their achievements are mentioned throughout the article. *Subject Headings:* **1. Upper atmosphere research 2. History of aerology 3. U.S.S.R.**—*I.L.D.*

ENVIRONMENTAL INFLUENCES

See: **Alt. and air density effects on fans** (Rogers), 10.4–98; **Precipitation-altitude relationships, Bohemia and Moravia** (Picko), 10.4–270.

SYNOPTIC CLIMATOLOGY

10.4–297 551.589(44,64/66)

*Gião, Antonio, **Premier programme de recherches sur la climatologie dynamique (avec un exemple d'application).** [First program of research on dynamic climatology, with an example of application.] *Geofisica Pura e Applicata*, Rome, 37:268–288, **1957.** 19 figs. (incl. charts), 12 refs., 16 eqs. **DLC**—Various parameters important in a dynamic climatology study of a region are discussed in relation to the general concept, and then separately. Pressure is considered the basic element; variation of pressure frequencies and mean amplitudes of disturbances, development and dissipation of disturbances, mean speed of disturbances, geostrophic analysis of weather types and, finally, an example of application to an area comprising France, the Western Mediterranean and N.W. Africa (Jan. 1956), using 10-day values for 46 stations, with all parameters tabulated and commented on. The method is easily adapted to use of electronic calculators in a manner analogous to that employed in numerical prediction. *Subject Headings:* **1. Dynamic climatology 2. France 3. Northwest Africa.**—*M.R.*

10.4–298 551.589

*Wahl, Eberhard W., **Mean monthly 300 and 200-mb contours and 500, 300 and 200-mb temperatures for the Northern Hemisphere.** *U. S. Air Force, Cambridge Research Center, Geophysical Research Papers*, No. 57, April **1958.** 80 p. 3 figs., numerous charts, 5 refs. 5 eqs. **DWB, DLC**—Mean monthly contour and temperature charts have been prepared from data compiled in **U. S. Weather Bureau, Monthly Climatic Data of the World** (*see* 5A–114

an. 1954, *MAB*). These charts are based upon a 6-yr period (1950 through 1955) and they present features of the temperature at 500, 300, and 200 mb and pressure height distributions 300 and 200 mb. The construction of these charts is discussed briefly and some general marks are made on the large-scale behavior of these data. *Subject Headings:* **1. Synoptic imatology 2. Northern Hemisphere temperature charts 3. Northern Hemisphere pressure harts.**—*Author's abstract.*

10.4–299 551.589.1:551.513:551.515.8

Uda, Michitaka, (*Tokyo Univ. of Fisheries, Japan*), **A note on the modification of air masses over the seas adjacent to Japan.** *Meteorological Society of Japan, Tokyo, 75th Anniversary Vol. of the Journal*, pub. Nov. **1957.** p. 372–377. 4 figs., 2 tables, 12 refs. **DWB, DLC**—The modification of air masses over the seas adjacent to Japan based on the distribution and the variation of air temperature (θ_0) minus sea temperature (θ) are studied, and by means of several maps of ($\theta_0 - \theta$) the areas of cyclogenesis or typhoon-genesis, areas of sea fog formation, and convection clouds on the seas are discussed, in relation to their mechanisms of development. *Subject Headings:* **1. Air mass modification over sea 2. Sea of Japan.**—*Author's abstract.*

MISCELLANEOUS

COSMIC INFLUENCES

See also: **Solar-terrestrial relationships** (Eigenson), 10.4–5; **Solar effects on radio propagation** (Houston et al.), 10.4–156.

10.4–300 551.590.24:551.510.535

†Minnis, C. M., (*D.S.I.R. Radio Research Station, Slough*), **The interpretation of changes in the E- and F1-layers during Solar eclipses.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 12(4):272–282, **1958.** 5 figs., 2 tables, 22 refs., 4 eqs. **DLC**—Recent eclipse measurements have been explained in terms of the response of a Chapman layer to the obscuration of a solar disk on which localized sources of ionizing radiation are superposed on a uniformly bright background. This interpretation is supported by several features of the results obtained during a series of eclipses. An alternative interpretation postulates a complex layer containing two different species of ion but assumes only a uniformly bright solar disk. This hypothesis has been examined but calculations based on it result in expected changes in the layer, during an eclipse, which are not in accord with certain characteristics of the experimental data. A suggestion has been made that the layer tilts which occur during an eclipse may give rise to errors in the interpretation of the data. Experimental results are quoted which suggest that such errors are probably not important. *Subject Heading:* **1. Eclipse effects on ionosphere.**—*Author's abstract.*

10.4–301 551.590.25:551.594.12:621.396

Davis, G. W. L.; Gladys, S. J.; Lang, G. R.; Luke, L. M. and Taylor, M. K., **The Canadian JANET System.** *Institute of Radio Engineers, Proceedings*, 45(12):1666–1678, Dec. **1957.** 3 figs. (incl. photos). **DLC**—JANET is a point-to-point communication system based on the forward scattering of radio waves from meteor trails. The properties of the transmission medium are such that special methods are required to take full advantage of them. Factors influencing system design have been discussed elsewhere; it is the purpose of this paper to describe a data handling equipment which has been designed for use on a single channel radio teletype link operating on the JANET principle. The equipment is designed for use with double sideband AM radio links having 3-kc bandwidths. Standard 60 wpm teletype machines are used for input and output, and the instantaneous transmission rate is 1300 wpm. *Subject Headings:* **1. Radio communication by meteor trails 2. JANET System 3. Meteor ionization trails 4. Canada.**—*Authors' abstract.*

VISIBILITY

See also: **Visibility meas. techniques** (Semenov), 10.4–106.

10.4–302 551.591.7:551.593.

Martz, E. P., Jr., **Visibility: detection and recording of objects against a sky background** *Society of Motion Picture and Television Engineers, N. Y., Journal*, 67(4):228–231, April 1958 3 figs. **DLC**—The term "visibility" is used in reference to detection and optical-photographi recording of objects of small apparent angular size viewed through the atmosphere and agains day- or night-sky background. The factors influencing such detection and recording ar discussed, including the relative luminance of the object by reflected sunlight or by artificia illumination, the attenuation by the intervening atmosphere, the luminance of the sk background due to scattered light, and the sensitivity and recording capabilities of the eye Other influencing factors include photographic emulsions, other optical detectors and th optical imaging system. This paper undertakes to demonstrate that detection and recordin are dependent upon the relative contrast between the object and the sky background and ar directly comparable to the astronomical problem of photographing stars against a day- o night-sky background. *Subject Heading:* **1. Visibility against sky.**—*Author's abstract.*

10.4–303 551.591.31:629.13(439.1

*Lépp, Ildikó and Rajkay, Ödön, **Repülőtereink éjszakai alkalmasságának kérdéséhez** [The problem of nighttime suitability of Hungarian air fields.] *Időjárás*, Budapest, 61(4) 278–284, July/Aug. **1957.** 3 figs., 2 tables, eqs. French summary p. 278. **DLC**—Data o visibility and ceiling at night in winter during weak pressure gradient (winds less than 4 m/sec are investigated for several stations in Hungary (1954, 1955). It is found that the low value of ceiling and visibility during daytime are not duplicated in the nighttime data for eithe element. *Subject Headings:* **1. Ceiling and visibility data 2. Night visibility 3. Airpor visibility 4. Hungary.**—*Trans. of authors' abstract* (*G.T.*).

OPTICAL PHENOMENA

See also: **Coronograph obs., Tschuggen Astrophys. Obs., Switz.** (Waldmeier), 10.4–7; **Noctilucent cloud obs. instructions,** 10.4–26; **Haze and horizon effects on sunshine, East Alps** (Roller), 10.4–210; **Flying saucers, Mt. Rainier, Wash.** (Reed), 10.4–262.

10.4–304 535.34:551.593.

Masui, T., **Note sur l'indice de réfraction de l'air dans le spectre visible.** [Note on th refractive index of air in the visible region of the spectrum.] *Revue d'Optique*, Paris, 36(6):281 284, June **1957.** table, 7 refs., 11 eqs. **DLC**—For the purpose of practical interferometri use, a general formula of the refractive index of air in the visible region of the spectrum i given. This formula was derived not only as a function of wave length but also of tem perature, atmospheric pressure and the concentration of water vapor and of carbon dioxide *Subject Heading:* **1. Refractive index (optical).**—*Author's abstract.*

10.4–305 551.593.653:778.5

Grishin, N. I., **Izuchenie dvizhenii serebristykh oblakov metodom kinos"emki.** [In vestigation of the movement of noctilucent clouds by a cinematographic method.] *Meteoro logiia i Gidrologiia*, Leningrad, No. 3:34–37, March **1957.** table, 2 refs. **DWB, DLC**—Th measurement of the "drift" of ionic and dust traces of meteors is compared with the measure ment of the "drift" of noctilucent clouds, and the superiority of slow motion photograph over still photography in studies of noctilucent clouds is discussed. The results of slow motio photography studies of noctilucent clouds carried out during 1953–56 are presented. Th wave-like nature of certain structural features of noctilucent clouds, such as ridges and scallop is confirmed. The movement of noctilucent clouds is analyzed with special reference t velocity, vortical movement, etc. Numerical data are presented in the variation in the length of waves and velocity of individual details of noctilucent clouds. *Subject Headings:* **1. Nocti lucent cloud movement 2. Cloud photography.**—*I.L.D.*

ELECTRICAL PHENOMENA

See also: **Atmos. elec. instruments** (Imianitov), 10.4–6; **JANET system, Canada** (Davis et al.), 10.4–301; bibliog. on **Sferics,** p. 588.

10.4–306 551.594

†aufm Kampe, H. J. (*Signal Corps Eng. Labs.*), **Atmospheric electricity.** *Meteorological Monographs* (American Meteorological Society), Boston, 3(12–20):256–278, July **1957.** 13 figs. (incl. photos), 4 tables, bibliog. p. 277–278, 11 eqs. **DWB, DLC**—Current progress, particularly during the interval 1951–1955, in the field of atmospheric electricity is reviewed. Four directions of research have been established in this field. They are: synoptic atmospheric electricity, aerological atmospheric electricity, the sources of compensation currents which maintain the negative charge of the earth and the mechanism of the various atmospheric generators, the thunderstorms and lightning. The author discusses the following subjects: synoptic atmospheric electricity including diurnal variations of potential gradient air-earth current for the entire globe centers, lightning discharges, electrostatic field changes, and atmospheric electrical instrumentation for measuring field strength, conductivity aloft and space charge. *Subject Heading:* **1. Atmospheric electricity.**—*I.L.D.*

10.4–307 551.594.1

Kawano, Minoru (*Electro-Technical Lab., Tokyo*), **The vertical distribution of the air resistivity in the exchange layer of the atmosphere.** *Meteorological Society of Japan, Tokyo, 35th Anniversary Vol. of the Journal,* pub. Nov. **1957.** p. 5–10. 9 figs., 10 refs., 12 eqs. **DWB, DLC**—The vertical distribution of the air-resistivity in the exchange layer is calculated by discussing the ionization equilibrium, considering the influence of the eddy diffusion. This result shows that the vertical distribution of the air resistivity in the exchange layer is controlled by the nuclei content, radioactive substance content and the coefficient of eddy diffusivity. The height of the exchange layer estimated by the vertical distribution of the air resistivity and columnar resistance is about 900∼1400 m. This calculated value coincides with that obtained by several direct observations. *Subject Headings:* **1. Electrical resistivity of atmosphere 2. Atmospheric electricity vertical distribution.**—*Author's abstract.*

10.4–308 551.594.1/2:551.501

Little (Arthur D.) Inc., Cambridge, Mass., **A study of techniques for measuring the concentration of space charge in the lower atmosphere.** Contract AF 19(604)-1920, Final Report, Jan. 31, **1958.** 163 p. 69 figs. (incl. photos), 6 tables. Bibliography p. 138–139. Appendix B: Vonnegut, Bernard; Moore, Charles B. and Botka, Alexander T.: **Preliminary results of an experiment to determine initial precedence of organized electrification and precipitation in thunderstorms,** p. 143–163. 4 figs., 15 refs. **DWB** (M94 L777st)—Space charge, the net electrical charge in the atmosphere, is defined, its role in atmospheric electrical processes is discussed, and theoretical expressions for its distribution in fair weather are derived. Possible methods, old and new, for measuring space-charge density in both fair and disturbed weather are critically examined. The development of a variety of different kinds of space-charge-measuring apparatus is described. The results obtained through use of various techniques for measuring space charge in both fair and disturbed weather are described. The most significant of these results appear to be the unexpectedly high fair-weather positive space charge of 300 elementary charges cm^{-3} over the summit of Mt. Withington, N. M., and the high density of 30 or more positive charges cm^{-3} found in fair-weather cumuli growing from this air. The development of space-charge-measuring techniques recommended for the second half of this planned two-year program is outlined. *Subject Heading:* **1. Atmospherice lectricity measurement.**—*Author's abstract.*

10.4–309 551.594.11:550.34

Cherniavskiĭ, E. A., **Atmosferno-elektricheskie predvestniki zemletriaseniĭ.** [Atmospheric-electrical precursors to earthquakes.] (In: Akademiia Nauk Uzbekskoĭ SSR. Institut Matematiki i Mekhaniki, **Meteorologiia i gidrologiia v Uzbekistane.** Tashkent, **1955.** p. 317–327. 5 figs., 10 refs.) **DLC**—Anomalies in the electric potential gradient of the

atmosphere were observed by the author to occur a few hours before an earthquake. Sul sequently other authors (H. R. SCULTETAS and C. HANEL) reported that optical phenomen termed "earthquake aurora," were associated with the occurrence of earthquakes. In th paper the author describes the atmospheric electricity anomalies, termed "electrical storms observed by him in connection with several earthquakes and the changes in electrical potenti gradient associated with explosions in which the explosion exceeded 1500 tons. On days of th earthquakes, the potential gradient dropped to zero when normally it rises, or its cour showed abnormal variations considering the characteristics of the meteorological or synopt conditions. Artificial explosions indicate sudden changes in the atmospheric electricity fiel Visual observations show that variations of potential gradient during explosions coincide time with the underground flow and precede somewhat the oscillation of the soil during th explosion. The stronger the explosion and the closer the point of observation, the more inten are the amplitudes of the electrometer filament. Curves of the potential gradients are pr sented and the origin of the electrical charge of the earth is discussed theoretically. *Subje Headings:* **1. Atmospheric potential gradient anomalies 2. Earthquake effects on atmospher electricity 3. Potential gradient variations during explosions.**—*I.L.D.*

10.4–310 551.594.1

Fries, G. and Dolezalek, H., **On parallelism occurring in the registration of potentia gradient and general local brightness.** Germany. Deutscher Wetterdienst (Aachen Me teorological Obs.) Contract AF 61(514)-640, Technical Note No. 7, March 1, **1956.** 13 p 6 figs., 9 refs. **DWB** (M94 A111t)—When continuously registering the atmospheric potentia gradient and the air-earth-current on one hand, and the general local brightness on the othe hand, occasional parallelisms and anti-parallelisms between these elements were observed Initial communication of these observations and some hypotheses with regard to their inte pretation are given here. *Subject Headings:* **1. Atmospheric potential gradient measurement 2. Potential gradient-brightness relationships.**—*Authors' summary.*

10.4–311 551.594.12:551.510.7(5

Kawano, M. (*Electrotechnical Lab., Tokyo*), **The ion pair production by each ionizin agent in the lower atmosphere, in Tokyo.** *Meteorological Society of Japan, Journal*, Ser. 35(6):343–349, Dec. **1957.** 8 figs., 3 tables, 20 refs., 9 eqs. **DWB**—The content of radi active substances in the atmosphere near the ground was measured in Tokyo, and the mea value was found to be 0.9×10^{-16} curie/cm^3 in the daytime and 2.3×10^{-16} curie/cm^3 at nigh Using these observed values and the coefficient of eddy diffusivity estimated by the metho of atmospheric electricity, the hourly values of the content of radioactive substances a calculated. The rate of ion pair production by α radiation emitted by the radioactive sub stances in the atmosphere is estimated. The earth radiation was measured and found to hav an ion pair production of (3.0 ± 0.1) J. Using these data the rate of total ion pair productio in the atmosphere is estimated. *Subject Headings:* **1. Ion pair production 2. Ion productio rate 3. Radioactivity in the atmosphere 4. Tokyo, Japan.**—*Author's abstract.*

10.4–312 551.594.12/3:621.316.9

Barla, Mario and De Bernochi, Cesare, **Un particolare tipo di dispositivo parafulmine a elevato potere ionizzante.** [Special type of lightning rod with high ionizing power.] *Geofisic e Meteorologia*, Genoa, 5(1/2):3–9, Jan./April **1957.** 5 figs., table, 7 refs., 24 eqs. **DWB**— The authors describe a new type of radioactive lightning conductor whose ionizing action i the free atmosphere is intensified by emissions of neutrons and by secondary induced radiatio The various primary, secondary, induced and neutron radiations are described, the formul given for calculating approximately the penetrating power of α, β, and γ radiation in norm air, and hence the ionic density in the ambient atmosphere, and the total ionizing effect up air as a function of distance from the lightning conductor are computed. The electrical co ductivity of air in the zone of action of the lightning conductor, and the relative variations of th values of the electrical field due to the apparatus and along the vertical axis of the latter a computed. Graphs are reproduced showing the conductivity of air as a function of the distan from the lightning conductor and along its larger axis in a vertical position, the electric fie *V/m* as a function of the distance from the lightning conductor along its greater axis in th vertical position, and values of the electric field gradient expressed in percent of that outsi the zone of action of the lightning conductor, as a function of distance. A photograph of th

nductor is given. *Subject Headings:* **1. Lightning rods 2. Radioactive lightning rod 3. Electical conductivity of air.**—*I.L.D.*

AURORAS

10.4–313 551.594.5(988,261)

Rodewald, Martin, **Nordlicht-Beobachtungen des MS. Nordland (Kapt. E. G. Steinbeck), 9.–14.10.1957.** [Auroral observations on the Nordland (Capt. Steinbeck) from Sept. 30–t. 14, 1957.] *Der Wetterlotse*, Hamburg, No. 124:226–231, Nov. **1957.** 2 figs. **DWB**—e paper contains three descriptions of northern lights observed by the crew of the motor ip "Nordland" in Sept. and Oct. 1957 to Port Churchill, Cape Farvel (South Greenland) d at sea during the trip to Hudson Bay. *Subject Headings:* **1. Auroral observations 2. South reenland 3. North Atlantic.**—*A.M.P.*

10.4–314 551.594.5(99)

Weill, G., **Aspects de l'aurore observée à la base Dumont-d'Urville en Terre Adélie.** aspects of the aurora observed at the Dumont-d'Urville base, in Adélie Land.] *Académie s Sciences, Paris, Comptes Rendus*, 246(20):2925–2927, May 19, **1958.** 1 fig., 1 ref. **DLC**—ne statistical study of the visual observations of the aurora, made in Adélie Land, in the urse of the year 1957, shows a property of the arcs passing close by the station. The auroral cs looming near to the zenith of the station present a wide amplitude systematic rotation, terms of the time. They remain approximately oriented towards the sun. It is noted on e other hand that these arcs are much more frequent in the second part of the night, prinbally at the beginning of the dawn twilight (63% after 16 hr U.T.). The existence of the tation phenomenon had been reported by Sir Douglas Mawson according to the obrvations at Denison Cape, 1912–1913. *Subject Headings:* **1. Visual observation of auroras Auroral rotation phenomenon 3. Dumont d'Urville, Adélie Land.**—*A.V.*

10.4–315 551.594.51:551.521.18(798)

Ashburn, Edward V.; Moore, J. G. and St. Amand, Pierre, **Auroral radiation in the 2 to 3 icron range.** *Journal of Geophysical Research*, Wash., D. C., 61(3):568, Sept. **1956. DLC**—cooled lead-sulfide cell in a d.-c. bridge was used to measure radiation in the 2–3 micron nge. A telescope and interference filters were used also. Auroral measurements were ade near College, Alaska. Radiation from the night sky and from auroral arcs and rays th visual intensity 3 to 4 on the International Intensity Scale was less than that detectable th the instrument used. This was less than 10^{-10} "effective" watt at the lead-sulfide cell. *ubject Headings:* **1. Auroral radiation 2. Night sky 3. Infrared radiation measurement chniques 4. Photoelectric cells 5. College, Alaska.**—*S. Fritz.*

10.4–316 551.594.51:535.33

Bagariatskiĭ, B. A., **Nekotorye dannye o raspredelenii energii v infrakrasnom spektre liarnykh siianiĭ.** [Some data on the distribution of energy in the infrared spectrum of the lar aurora.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.* No. 4:540–542, **1957.** figs., ble, 9 refs. **DLC.** Trans. into English by R. E. Daisley in the English language edition the **Izvestiia,** *Bulletin of the Academy of Science of the U.S.S.R., Geophys. Series*, No. 4:149–0, **1957,** issued 1957 by American Geophy. Union.—The results of measurements of the ative intensities of infrared emission in the 8000–10,000 Å region of two auroral spectra e presented. The spectra were obtained on March 1956 with a differential spectrograph d four hourly exposures. Intensity was calculated relative to the zone of the first negative stem of nitrogen $\lambda = 3914$ Å and $\lambda = 4278$ Å recorded simultaneously with infrared increases the second order. *Subject Headings:* **1. Auroral spectral intensity 2. Infrared auroral issions.**—*I.L.D.*

10.4–317 551.594.51:535.33

The origin of the aurora. *Current Science*, Bangalore, 26(9):280–281, Sept. **1957. DWB** In Aug. 1950, A. B. Meinel, at Yerkes, in the U. S. recorded two spectra which proved the esence of hydrogen in auroral regions. This hydrogen moves at high speed through the per atmosphere; 2000 mi/sec. in the direction of the lines of force of the earth's magnetic d. This confirms the fact that protons or hydrogen nuclei are contained in the particle eam from the sun. *Subject Headings:* **1. Solar proton theories 2. Auroral spectra.**—*N.N.*

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON THUNDERSTORM SFERICS (SUPPLEMENT)

Compiled by: *Geza Thuronyi*

Note: The purpose of this supplement is to bring up to date a bibliography published in t November 1953 issue of *Meteorological Abstracts and Bibliography*. The subject outline giv below is identical in arrangement with the one in the Nov. 1953 issue and refers to both this supp ment and the original bibliography.

OUTLINE OF CONTENTS

SUBJECT OUTLINE

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10D–1 551.594.6

Allcock, G. McK. and Martin, L. H., **Simultaneous occurrence of "dawn chorus" at places 0 km. apart.** *Nature*, London, 178(4539):937–938, Oct. 27, **1956.** 3 figs., 3 refs. **DWB**—Obrvations on 273 simultaneous schedules at Wellington and Dunedin, 600 km apart on a geomagnetic eridian, show groups of whistlers on 106 occasions at Wellington and 64 at Dunedin, 56 being nultaneous within 0.1 sec. Variations with signal strength are shown; the wave range is less than octave. (*Same item as* 8.2–325, Feb. 1957, *MAB.*) *Subject Heading:* **1. Sferics.**—*C.E.P.B.*

10D–2 551.501.83:538.56:551.594.6

†Al'pert, Ia. L. and Borodina, S. V., **Issledovanie rasprostraneniia dlinnykh i sverkhdlinnykh diovoln metodom analiza form atmosferikov.** [Analysis of the distribution of long and very long dio waves by means of analysis of the wave form of atmospherics.] *Radiotekhnika i Elektronika*, oscow, **1**(3):293–305, **1956.** 10 figs., tables, 20 refs., 25 eqs. **DLC** (Slavic, Deck 8)—A method for taining data on the propagation of low frequency electromagnetic waves on the basis of a complete rmonic analysis of photo-oscillograms of individual atmospherics, excited by thunderstorm disarges, is described. The experimental installation, results of its testing, and of some measureents are briefly described. Common characteristics of atmospheric configurations, and results analysis of one of their types are presented. It is shown that the data on the dependence of the ld's relative amplitude, and of the average velocity—on the frequency and on distance—are, on e whole, in good agreement with the results of theoretical calculations. *Subject Headings:* **1. Elecmagnetic wave propagation 2. Sferics wave forms.**—*Authors' abstract.*

10D–3 551.510.535:551.594.5

Arkhangel'skiĭ, B. F. and Pabo, N. V., **Rasprostranenie radiovoln v vysokikh shirotakh.** [Rad wave propagation in high latitudes.] *Leningrad. Arkticheskiĭ Nauchno-Issledovatel'skiĭ Instit Trudy*, Vol. 124, **1938.** 88 p. 55 figs., 6 tables, refs. at end of each chapter. **DLC**—A very thorou treatment of all available data on Arctic troposphere and ionospheric radio propagation conditio and their disturbance by solar, magnetic, auroral and static (sferics) activity. Actual record records as well as derived diagrams, tables and curves are presented. Numerous references a given to the sources (mostly 1932–1937 in Russian periodicals). Theoretical considerations are n neglected but applications to study of atmosphere—especially the upper layers—and the auroi ionosphere, terrestrial magnetism and atmospheric electricity are emphasized. The study is bas on data obtained in 1932/33 and 1934/35 at Tikhaia (Calm) Bay in Franz Josef Land, and oth Polar Year stations in 1932/33. (*Same item as* 5I–73, Sept. 1954, *MAB.*) *Subject Heading* **1. Radio wave propagation 2. Ionosphere 3. Tropospheric propagation 4. Sferics 5. Auror research 6. Arctic geophysical research 7. Tikhaia (Calm) Bay, Franz Josef Land.**—*M.R.*

10D–4 551.508.

Benoit, R. and Kernevez, J. (*Saigon*), **Etude d'un dispositif d'enregistrement des atmosph riques.** [Study of an apparatus for recording atmospherics.] *Annales de Géophysique*, Par 13(4):321–324, Oct./Dec. **1957.** 4 figs., 4 refs., eqs. **DLC**—In connection with a study of tropic thunderstorms the authors developed a very simple sferics recorder consisting of a Philips fiel strength meter and two electron tubes. The instrument is described and shown in a schemat diagram. Response of the apparatus to series of pulses, integrating effectiveness, and other pe formance characteristics are discussed. *Subject Heading:* **1. Sferics recorders.**—*G.T.*

10D–5 551.508.

Blanton, J. E. and Mooney, D. F., **Investigation of atmospheric radio noise.** Florida. Univ Gainesville. Engineering and Industrial Experiment Station, Contract AF 19(604)-876, Scienti Report, No. 16, Aug. 15, **1957.** 23 p. 6 figs., 2 refs. **DWB** (M94.6 F636i)—A complete descriptio of the UF/LSR-1, Lightning Stroke Recorder is given. Diagrams and photographs are includ to clarify the operation of the unit. Explanations of the changes made since the device was fir proposed are given, and improvements which may be incorporated in future models are discusse *Subject Heading:* **1. Lightning stroke recorders.**—*Authors' abstract.*

10D–6 551.594.6:551.590.

Bost, R. (*Nat. Lab. of Radio Electricity, Bagneux/Seine*), **Influence de l'éclipse du 30 juin 19 sur la propagation des atmosphériques sur la fréquence de 27 kc/s.** [Influence of the June 30, 19 eclipse on the propagation of atmospherics on the 27 kc/s frequency.] (In: **Solar eclipses and th ionosphere: a symposium** . . . ed. by W. J. G. Beynon and G. M. Brown. London, Pergamo **1956.** p. 132–136. 3 figs.) **DWB**—A brief account is given of recordings of atmospherics o several frequencies during the eclipse of June 30, 1954. Quite pronounced enhancement was o served for the weaker atmospherics on 27 kc/s, but no eclipse effects were observed at frequenci in the range 4–12 kc/s. (*Same item as* 9.6–289, June 1958, *MAB.*) *Subject Headings:* **1. Eclip effects on sferics 2. Solar eclipse, June 1954.**—*Author's abstract.*

10D–7 551.510.62:621.3

*Bowe, P. W. A. (*Cavendish Lab., Cambridge*), **A study of individual radio atmospherics receiv simultaneously at two places.** *Philosophical Magazine*, London, 44(355):833–840, Aug. 195 4 figs., 3 tables, 4 refs. **DWB**—A previous paper (Bowe 1951) described a method of studying th propagation of radio waves of frequency 2 kc/s to 10 kc/s over the surface of the earth, by observi the responses of narrow-band receivers to individual radio atmospherics. The present paper d scribes an extension of these observations in which the same method was used simultaneously at tw places, Cambridge and Aberdeen, 550 km apart. The narrow band receivers at both places we tuned to frequencies 7.5, 5.0, 3.5 and 0.6 kc/s. By comparing the responses at the two places, th attenuation factors for each frequency could be found. The sources of the atmospherics we located by the 'Sferic' direction finding system of the Meteorological Office, supplemented by direction finder at Cambridge. Most of the observations were made at about noon. The resul are presented as tables giving the propagation factor for 1000 km path, for the four frequenci studied. It was found that waves of frequency 0.6 kc/s are less attenuated than waves of frequen 3.5 kc/s. The results for 7.5 and 5.0 kc/s appear to indicate that the attenuation is less in wint than in summer. (*Same item as* 6.11–106, Nov. 1955, *MAB.*) *Subject Headings:* **1. Radio wav propagation 2. Sferics sources 3. Cambridge, Eng. 4. Aberdeen, Scotland.**—*Author's abstract.*

10D–8 551.501.83

Brockel, H. W., **Summary of the sferics program at SCEL.** *Weather Radar Conference, Sept. 55, Proceedings of the Fifth Conference*, pub. **1956.** p. 213–219. 9 figs. **DWB**—This is a summary report on the investigations and experiments made under Sir Robert Watson-Watt (1943–1944) in how convective meteorological storms could be located by direction-finding on the atmospheric electrical discharges (sferics). By June 1945, three successful sferics networks were established in the Pacific areas as follows: China proper, the Philippine Islands area and the Pacific Island area. *Subject Headings:* **1. Sferics storm detection 2. Sferics networks 3. China 4. Pacific Ocean.** *—N.N.*

10D–9 551.594.6:550.38

Budden, K. G. (*Cavendish Lab., Cambridge*), **The propagation of a radio atmospheric, Pt. 2.** *Philosophical Magazine*, London, 7th Ser., 43(346):1179–1200, Nov. **1952.** 6 figs., 15 refs. **DWB**—The present paper gives the full mathematical theory, and shows how the characteristics of the wave-guide modes may be determined in the most general case, provided that the reflecting properties of the earth and the ionosphere are known as functions of the angle of incidence which is, in general, complex. It is found that the wave-guide modes are of two types, which are described as "quasi-transverse magnetic" and "quasi-transverse electric." Allowance can be made for the curvature of the earth. A particular case is then discussed, in which the surface of the earth is assumed to be perfectly conducting, and the ionosphere is assumed to be a homogeneous ionized medium, with the steady magnetic field of the earth superimposed. The results of numerical calculations are given, for a few special cases, in the form of curves. These show (i) the attenuation in the various modes as a junction of frequency, (ii) the polarization characteristics of the wave in typical modes and (iii) the amplitudes of the wave which are excited in typical modes by a vertical electric dipole source. (For Pt. 1, *see* 4K–231, Nov. 1953, *MAB. Same item as* 6.4–340, April 1955, *MAB.*) *Subject Headings:* **1. Radio wave propagation 2. Terrestrial magnetism 3. Sferics propagation 4. Wave guides.**—*From author's abstract.*

10D–10 551.501.83:551.594.6

Carbenay, Fernand, **L'enregistrement du niveau moyen des atmosphériques sur ondes kilométriques et myriamétriques.** [Recording of the mean level of atmospherics over kilometric and myriametric waves.] *Académie des Sciences, Paris, Comptes Rendus*, 243(23):1904–1906, Dec. 5, **1956.** fig., 3 refs., eqs. Also his: **Etalonnement des radiogoniomètres d'atmosphériques (à secteur étroit).** [Calibration of sferics radiogoniometers (narrow-sector).] *Ibid.*, 243(3):298–300, July **17, 1957.** fig., eqs., 4 refs. **DWB**—Describes method of measurement and calibration for narrow-sector radiogoniometers to be used at six stations under the French IGY program. *Subject Headings:* **1. Sferics recording 2. Radiogoniometers.**—*G.T.*

10D–11 551.594.6:621.396.821

Chandrashekhar Aiya, S. V., **Measurement of atmospheric noise interference to broadcasting.** *Journal of Atmospheric and Terrestrial Physics*, 5(4):230–242, Sept. **1954.** fig., 15 refs. **DWB**—Desiderata for measuring standardized noise level in India as a statistical quantity are set out. Measurements of atmospherics give a median duration of 0.18 sec; only 3% exceed 0.5 sec. Ten impulses a minute would affect 10% of broadcast words and is taken as minimum causing annoyance. Noises are classified into 3 types. Subjective results are applied to objective observations with a noise meter and method of statistical analysis is described. (*Same item as* 6.5–348, May 1955, *MAB.*) *Subject Headings:* **1. Radio noise 2. India.**—*C.E.P.B.*

10D–12 551.594.6:551.515.4

Chandrashekhar Aiya, S. V.; Khot, C. G.; Phadke, K. R. and Sane, C. K. (*all, College of Engineering, Poona*), **Tropical thunderstorms as noise radiators.** *Journal of Scientific and Industrial Research, Sec. B*, New Delhi, 14(8):361–376, Aug. **1955.** 11 figs., table, 8 refs., eqs. **DWB, DLC**—Tropical thunderstorms are characterized mainly by lightning within clouds. Atmospherics result in the range 1–20 Mc/s. The range 1–10 Mc/s is investigated. Noises are classified according to acoustical effect in loudspeaker. The evaluation is made difficult by the movement of thunderstorms. Three types of noise phenomena during thunderstorms are distinguished, depending on time of occurrence and intensity of growth and decay. Frequency during different seasons is given. Thunderstorms over the sea seem to originate different noise characteristics. (*Same item as* 8.8–316, Aug. 1957, *MAB.*) *Subject Headings:* **1. Sferics 2. Tropical thunderstorms 3. Poona, India.** *—A.A.*

10D–13 551.594.6:551.515.4:621.396.8

Chandrashekhar, Aiya, S. V. (*Ahmedabad, India*), **Atmospheric noise interference to medium wave broadcasting.** *Institute of Radio Engineers, Proceedings*, 46(8):1502–1509, Aug. **1958.** 3 figs.,

3 tables, 11 refs., 25 eqs. **DLC**—A brief description is given of the typical tropical thundercloud and the electrical discharges associated with it. A detailed description of the discharge that contributes significantly to noise in the medium wave band is presented. A systematic physical analysis of the source and course of atmospheric noise impulse is given, and of its annoyance to the listener of broadcast programs. This paper contains criteria developed for the measurement and estimation of such noise. The results of the investigation are expected to hold over the frequency range 0.23 to 2.5 mc. *Subject Headings:* **1. Radio noise 2. Sferics from thunderstorms.**—*N.N.*

10D–14 551.508.8

Chandrashekhar Aiya, S. V., **Conversion data for atmospheric noise interference measurements.** *Journal of Scientific and Industrial Research, Sec. B*, New Delhi, 17(9):337–339, Sept. **1958.** 2 tables, 10 refs., 8 eqs. **DLC**—Atmospheric radio noise, a source of interference to broadcasting, is measured by an objective noise meter and noise levels are deduced from such measurements. The noise meter is calibrated using continuous signals, modulated 30%, by a 400 cycle note. Theoretical calculations have shown that it is sometimes necessary to convert the noise data thus obtained to data corresponding to calibrations employing other levels of modulation. The equation required for such conversion has been deduced. Conversion data obtained experimentally agree with those deduced theoretically. *Subject Heading:* **1. Radio noise measurement.**—*Author's abstract.*

10D–15 551.594.

Chapman, F. W. and Macario, R. C. V., **Propagation of audiofrequency radio waves to great distances.** *Nature*, London, 177(4516):930–933, May 19, **1956.** 4 figs., 13 refs. **DWB**—The main energy of atmospherics is in audio-frequency band <10 kc/s, with high attenuation above 5 kc/s. Higher frequency components move faster than lower frequencies, leaving a slow tail. Spectrometer measurements on magnetic tape, which also contains a record of thunderstorms, are described. A model of relative amplitudes of frequency components at different distances, 200–2000 km, is shown. The main contribution to signal strength $E(f,r)$ is represented by $A(f)r^{\frac{1}{2}} \exp[-\alpha(f)r]$ (f, frequency; r, distance). Plots for a number of frequencies at different distances are given. Day and night attenuations for propagation over ground are compared with theoretical values. (*Same item as* 7.11–308, Nov. 1956, *MAB.*) *Subject Headings:* **1. Sferics from lightning 2. Sferics propagation.**—*C.E.P.B.*

10D–16 551.594.

Chapman, J. (*Courtauld's Ltd., Coventry, Eng.*) and Pierce, E. T. (*Cavendish Lab., Cambridge, Eng.*), **Relations between the character of atmospherics and their place of origin.** *Institute of Radio Engineers, N. Y., Proceedings*, 45(6):804–806, June **1957.** fig., 3 tables, 8 refs. **DLC**—From recent experimental work at Cambridge, Eng., it is shown that atmospherics originating from different geographical localities are systematically different in character, even when the distances of propagation are the same and there is no reason to anticipate appreciable dissimilarities in the ionosphere along the respective propagation paths. Detailed and precise information is given of how these "geographical" effects may be traced by recording and classifying types of waveforms. It is also shown that the effects are apparent for observations of atmospherics at fixed frequencies between 0.65 and 27 kc. No attempt is made to assign a reason for the geographical phenomena, but the most promising approach would seem to be by considering differences in the conductivity of the earth's surface, and in particular, those between land and sea. (*Same item as* 9.6–290, June 1958 *MAB.*) *Subject Headings:* **1. Sferics origin 2. Sferics wave forms.**—*Authors' abstract.*

10D–17 551.594.

Chapman, J. and Pierce, E. T. (*both, Cavendish Lab., Cambridge, Eng.*), **Les types d'ondes, le spectres de fréquence et la propagation des atmosphériques.** [Waves types, frequency spectra and propagation of atmospherics.] *L'Onde Electrique*, Paris, 37(362):523–525, May **1957.** 4 figs, 5 refs. **DLC**—From a statistical analysis of the relation between wave forms and frequencies of sferics recorded at Cambridge, Eng., curves of wave type frequency correlation are deduced. Results of propagation measurement over 18 Mc are consistent with the waveguide mode of propagation advanced by Budden (1951). *Subject Headings:* **1. Sferics propagation 2. Sferics frequencies 3. Cambridge, Eng.**—*G.T.*

10D–18 551.501.83:551.510.6

Chapman, J. (*Courtauld's Ltd., Coventry*), **The waveforms of atmospherics and the propagation of very low frequency radio waves.** *Journal of Atmospheric and Terrestrial Physics*, London 11(3/4):223–236, **1957.** 14 figs. (incl. photos), 25 refs., eqs. **DLC**—Experimental observations upon atmospherics by several techniques are described. It is shown, in particular, that the results obtained for wave forms and for frequency spectra can be interrelated. The frequency spectrum of the electromagnetic disturbance at the source—the lightning discharge—is considered, and evidence

presented indicating appreciable differences, in this respect, between individual flashes. The terpretation of the results, on the basis of wave-guide theory, applied to the space between the rth and the lower ionosphere, is considered; this approach is entirely successful qualitatively, but nantitatively the agreement is less satisfactory. (*Same item as* 10.1–131, Jan. 1959, *MAB.*) *ubject Headings:* **1. Sferics wave forms 2. VLF radio wave propagation.**—*Author's abstract.*

10D–19 551.501.83:551.596

†Chiplonkar, M. W., **The wave-forms of atmospherics.** *Endeavour*, London, 12(48):190–196, ct. **1953.** 11 figs., 28 refs. **DWB**—Beautiful examples of oscillograph records showing wave rms of various types are included in the form of glossy photograph prints. Atmospherics are efined, their origin briefly discussed, the processes operating when a lightning flash occurs are scribed and illustrated schematically. Recent discoveries made in Australia, South Africa, India nd the United Kingdom regarding the wave form of atmospherics, their explanation, the propagation echanism and the waveguide-mode theory are outlined in a very lucid manner. (*Same item as* 10–67, Oct. 1955, *MAB.*) *Subject Headings:* **1. Sferics wave forms 2. Sferics research.**—*M.R.*

10D–20 551.501.83:551.506.22(547.1)

Chiplonkar, M. W.; Karekar, R. N.; Raju, T. A. and Hattiangadi, M. S. (*all, Dept. of Physics, oona Univ.*), **A preliminary report "On the nature and origin of atmospherics."** *Journal of Scientific nd Industrial Research*, Sec. A, New Delhi, 17(12), Special Supplement, Dec. **1958.** p. 3–23. figs. (incl. photos), 4 tables, 6 refs. **DWB, DLC**—Preliminary results of investigations on the w frequency atmospherics carried out as part of the IGY programme in the University Department Physics at Poona are presented and discussed in sections on 1) The rate of reception of atmospherics n four selected frequency bands (85, 125, 175 and 455 Kc/s) obtained during the period June 1957 May 1958; 2) Recording of the intensity of atmospherics on 85 Kc/sb and, June 1957–May 1958; Simultaneous observations of intensity of atmospherics on the four frequency bands, July 1957–ne 1958; 4) Directional distribution of sources of atmospherics around the station, Aug. 1957–ly 1958; 5) Waveforms, April 1957–Aug. 1958. The results under each section are presented the form of sample diagrams and tentative conclusions are drawn. (Three papers containing ll details are under publication.) *Subject Headings:* **1. Sferics source distribution 2. IGY sferics rogram 3. Poona, India.**—*Authors' summary.*

10D–21 551.501.83(547.1)

Chiplonkar, M. W. and Athavale, V. N. (*both, Dept. of Phys., Univ. of Poona, India*), **Simultaneus recording of atmospherics on four different frequency bands in the low-frequency region.** *ournal of Atmospheric and Terrestrial Physics*, 13(1/2):32–37, Dec. **1958.** 4 figs., 3 tables, refs. **WB**—With a view to studying the variations in the intensity and the number of atmospherics ceived in the low-frequency region, four narrow band t.r.f. receivers were designed and constructed. he bands are 85 Kc/s, 125 Kc/s, 175 Kc/s and 455 Kc/s, respectively. The output of the receivers ere given to the X-deflecting plates of four identical cathode ray tubes. A moving plate camera ith an f/2.5 coated lens recorded simultaneously the deflections of all the c.r.t. spots. Records of min duration were taken at two fixed hours (2000 and 2200 hours) during the night. In all over enty plates were obtained during the period March–June 1956. The plates were measured to ive intensities and number of atmospherics on the four bands. The results were analyzed statistically and summarized in tables and presented in the form of histograms and curves. It is found at: (a) atmospherics with relatively large field strengths are less frequent than those with smaller eld strengths on each band; (b) the field strength of atmospherics received on 125 Kc/s band has aximum values as compared with those on the other bands, and in fact is the seat of maximum tivity of atmospherics with both large field strengths and number. *Subject Headings:* **1. Sferics ource distribution 2. Radiogoniometers 3. Poona, India.**—*Authors' abstract.*

10D–22 551.501.83:551.515.43

Clarke, C. and Byrne, B. J., **The location of thunderstorms by a single-station high-frequency anging technique.** *Journal of Atmospheric and Terrestrial Physics*, 9(4):210–228, Oct. **1956.** 10 gs., 6 refs. **DWB**—An improved set-up at the Radio Research Station, Slough, is shown; the andard components including cathode ray tubes with persistent screens. A brilliance modulator triggered by atmospherics reaching a predetermined field strength; otherwise no trace appears. nowing the layer controlling propagation of sferics, the range is determined from calculated critical equencies and MUFs, but this cannot be done when propagation is controlled by sporadic E. xamples are plotted for thunderstorms over Europe on Sept. 8 and July 30, 1954, compared with cations by British direction finders; the accuracy is comparable. The ranging technique can cate thunderstorms distant 500–2000 km, but except in winter the measurements must be combined ith back-scatter measurements. (*Same item as* 8.2–67, Feb. 1957, *MAB.*) *Subject Heading:* **Sferics thunderstorm location.**—*C.E.P.B.*

10D–23 551.501.8

Comparisons of sferics systems. *World Meteorological Organization, WMO Bulletin*, 5(3):11 July **1956. DWB**—A review of the report rendered by J. LUGEON and J. RIEKER of the Swi Meteorological Service on the second comparison of sferics observed in the United Kingdom, Fran and Switzerland. Thirteen countries were asked to supply reports of the thunderstorms observe during the trials (Jan. 11–Feb. 11, 1955). More coincidence was found between fixes record in France and Great Britain than between France and Switzerland or Great Britain and Switzerlan Cathode ray direction finding (CRDF) method, where readings are made for only 10 min eac observation, is not considered satisfactory for detecting winter thunderstorms. *Subject Headin* **1. Sferics system comparisons. I. Lugeon, J.**—*M.R.*

10D–24 551.501.83:551.594

Crary, J. H.; Helliwell, R. A. (*both, Stanford Univ.*) and Chase, R. F. (*Boeing Airplane Co Seattle, Wash.*), **Stanford-Seattle whistler observations.** *Journal of Geophysical Research*, Wash D. C., 61(1):35–44, March **1956.** 6 figs., 4 refs., 4 eqs. **DLC**—Simultaneous observations of time of occurrence of whistlers were made at Seattle, Wash., and Stanford, Calif., two hours every wee from Oct. 1951 to Oct. 1952. Times were measured to an accuracy of about ±1 second. Th objective was to determine the percentage of whistlers received at either station which were c incident at both. A total of 318 whistlers was received at Stanford and 283 at Seattle during simu taneous observations. The occurrence rate of whistlers (during a two-hour period) varied from to roughly 55 per hour at Stanford and from 0 to 70 per hour at Seattle. The correlation betwee the occurrence rates was poor. The number of true coincidences was found by subtracting th number of chance coincidences from the number of total coincidences. A method for computin the number of chance coincidences from a knowledge of the time intervals between whistlers at th one station was derived. The analysis showed that approximately 22 percent were observed simu taneously at both stations. This result is examined in relation to possible theories of whistl origin and propagation, and is shown to support the Storey-Eckersley theory. (*Same item a* 8.3–95, March 1957, *MAB.*) *Subject Headings:* **1. Sferics frequencies 2. Whistlers.**—*Author abstract.*

10D–25 551.594.6(73

Crichlow, William Q. (*Nat. Bureau of Standards, Boulder, Colo.*), **Noise investigation at VL by the National Bureau of Standards.** *Institute of Radio Engineers, N. Y., Proceedings*, 45(6):778 782, June **1957.** 9 figs., 7 foot-refs. **DLC**—The principal objective of the Radio Noise Sectio at the National Bureau of Standards is the establishment of a regular service for predicting th levels and characteristics of radio noise. The various steps necessary to establish such a service a NBS are summarized. The characteristics of atmospheric noise vary with location, frequenc and time, and methods of dealing with these variations are discussed. Also discussed are ne predictions of world-wide noise levels which have been prepared for the International Radio Co sultative Committee (CCIR). *Subject Headings:* **1. Sferics data 2. United States.**—*Author abstract.*

10D–26 551.594.6(73

*Crichlow, W. Q.; Disney, R. T. and Samson, C. A., **Atmospheric radio noise summary for th period June 1 through Nov. 30, 1957.** *U. S. National Bureau of Standards, NBS Report* 555 Feb. 20, **1958.** 25 p. 8 figs., 16 tables. **DWB** (621.384 U58at). Also their **Atmospheric radi noise for the period Dec. 1, 1957 through Feb. 28, 1958.** *Ibid.*, 5580, June 23, **1958.** 3 p. 7 figs ref. **DWB** (M94.6 C928at)—The first article is a summary report of noise measurements mad during the period June 1 through Nov. 30, 1957 by stations in the recording network which is supe vised by the National Bureau of Standards. Stations engaged whole time or part of the period we as follows: Boulder, Colo.; Bill, Wyo.; Front Royal, Va.; Marie Byrd Base, Antarctica; Balbo Canal Zone; Ibadan, Nigeria; Thule, Greenland. Studies in this field are intended to produ more specific recommendations for future noise predictions. In the second article, radio noi measurements during the period Dec. 1, 1957 through Feb. 28, 1958 have been summarized for th following stations: Boulder, Colo.; Bill, Wyo.; Front Royal, Va., and Balboa, Panama Canal Zon Details of data analysis show the existence of contamination from signals, man-made voice, an receiver noise. A procedure adopted to eliminate these effects and to obtain a "best estimate" of true atmospheric noise level at each station is described. Differences between the predictions an observations are discussed by time blocks. *Subject Headings:* **1. Sferics data 2. Radio nois 3. United States.**—*N.N.*

10D–27 551.594.6:551.508.8

Delloue, Jean, **Sur la direction d'arrivée et la polarisation des atmosphériques siffleurs.** [Dire tion of incidence and the polarization of whistling atmospherics.] *Académie des Sciences, Par*

Comptes Rendus, 244(6):797–799, Feb. 4, **1957. DLC**—An apparatus used for selective observation of whistling atmospherics is described. Observations made with the apparatus show that whistling atmospherics always come from a direction close to that of the geomagnetic field. The direction of an individual whistler varies simultaneously with its polarization. The existence in the high atmosphere of very small ionized regions of short duration was ascertained. (*Same item as* 10.2–343, Feb. 1959, *MAB.*) *Subject Headings:* **1. Whistlers 2. Radio noise 3. Sferics 4. Whistler polarization 5. Whistler recorders.**—*Trans. of author's abstract.*

10D–28 551.501.83:551.515.3/4

Dickson, Edwin B., **Analysis of sferics and its relation to severe thunderstorm phenomena** *Weather Radar Conference, Sept.* 1955, *Proceedings of the Fifth Conference*, pub. **1956.** p. 15–21. 3 figs., 5 refs. **DWB**—Sferics in the near future, will be one of the most reliable means of aiding the weather forecaster when adequate equipment has been made available. The author surveys the interrelations of Sferics with tornadoes, windstorms, and hailstorms; he also emphasizes the importance of information to be gained from analysis. *Subject Headings:* **1. Sferics from tornadoes 2. Sferics from thunderstorms 3. Tornado forecasting from sferics.**—*N.N.*

10D–29 551.501.83:551.515.3/4

Dickson, Edwin B. and McConahy, Raullo J. (*both, Severe Weather Warning Center, K. C., Mo.*), **Sferics readings on windstorms and tornadoes.** *American Meteorological Society, Bulletin*, 37(8):410–412, Oct. **1956.** 3 figs. (incl. photos), 8 refs. **DWB**—Project Tornado-Sferics, conducted by the Severe Weather Warning Center at Tinker Air Force Base, Okla., from June 21, to Oct. 2, 1954, and Feb. 16 to Sept. 11, 1955, obtained considerable data from 3 bases in Kansas and Arkansas on sferics before and after thunderstorms with wind gusts of 50 kn or more, and tornadoes, respectively. The maximum frequency of sferics connected with wind squalls occurred 1 hour before the storm in 1954 and 45 min. before the squall in 1955, whereas the maximum frequency for tornadoes was 1½ hrs in both cases. This characteristic difference between the time of maximum and time curves for tornadoes and for ordinary severe thunderstorms can be used in prediction although the cause is not known. (*Same item as* 9.4–71, April 1958, *MAB.*) *Subject Headings:* **1. Sferics from tornadoes 2. Sferics from thunderstorms 3. Kansas 4. Arkansas.**—*M.R.*

10D–30 551.509.52:551.501.83:551.515.3

Dickson, Edwin B., **Detection of developing tornadic activity.** *American Meteorological Society, Bulletin*, 37(10):517–518, Dec. **1956.** fig., 9 refs. **DWB**—A condensed summary of findings of the Project Tornado-Sferics conducted by the Severe Weather Warning Center in 1954 and 1955, using Air Weather Service sferics stations at Altus Air Force Base, Okla., Camp Chaffee, Ark., and Smoky Hill A.F.B., Kans., and operating at 10 kc. It was found during May–Aug. 1955 that 61 out of 76 (80%) of records of "long bursts" of sferics were later verified by reports of tornadoes, usually 1–3 hrs after bursts began. The 76 fixes represent 1.7% of the total number of fixes obtained during the 4 months. Average rate of sferics in bursts was 26.2 pips/sec, the maximum 55/sec. Many tornadoes occurred, however, without 10 kc long bursts, but 80% were caught on 15 kc. (*Same item as* 8.7–139, July 1957, *MAB.*) *Subject Headings:* **1. Sferics tornado detection 2. Tornado forecasting from sferics.**—*M.R.*

10D–31 551.501.83:551.594.6

†Dinger, Harold E. (*Naval Research Lab., Communication Branch, Radio Div.*), **Whistling atmospherics.** *U. S. Naval Research Laboratory NRL Report* 4825, Sept. 14, **1956.** 37 p. numerous figs., 20 refs., 2 eqs. Price: $1.25. **DWB.** Also his **Sifflements atmosphériques exceptionnels.** [Exceptional whistling atmospherics.] *L'Onde Électrique*, Paris, 37(362):526–534, May **1957.** 11 figs. **DLC**—Since 1953, NRL has been observing and recording audio-frequency atmospherics and their correlation with other geophysical phenomena. Beginning in April 1955, the diurnal variation in both whistler activity and the occurrence of "dawn chorus" has been determined. Whistler coincidence at several locations has been recorded in an attempt to prove L. R. O. Storey's theory on the mode of propagation of these atmospherics. In the second article, some 90 photographs of spectograms obtained from tape recordings of whistlers made in Wash., D. C., in 1955 and 1956 are presented. Most of these whistlers (generally connected with intense geomagnetic activity) display characteristics which are at variance with available theory of propagation. This is particularly true of the types having components, the frequency of which rises progressively. (*Same items as* 9.4–281 and 9.11–128, *MAB.*) *Subject Headings:* **1. Whistlers 2. Washington, D. C.**—*Author's abstract, G.T.*

10D–32 551.594.6:551.590.24

Ehmert, Alfred and Revellio, K. (*both, Max-Planck Inst. für Physik der Stratosphäre, Weissenau bei Ravensburg*), **The influence of the solar eclipse of June 30, 1954 on low-frequency atmospherics.**

(In: **Solar eclipses and the ionosphere: a symposium** . . . ed. by W. J. G. Beynon and G. M Brown. London, Pergamon, **1956.** p. 126–131. 7 figs., 2 refs.) **DWB**—Records of atmospheric on 13 kc/s obtained at Weissenau during the solar eclipse are compared with other European record For small atmospherics from distant centers, the variations show a distinct peak during the eclips This peak is absent for stronger atmospherics of the same frequency and also for higher frequencie from nearer discharge centers. Narrow-sector d.f. observations at Payerne and Zurich, togethe with meteorological information, enable the source of these atmospherics to be located near the Azo Sea and the Caucasus at distances from 2000 to 2500 km. Best transmission occurred when th sun was more than 75% obscured at both reflection points for the doubly reflected waves. (*Sam item as* 9.6–291, June 1958, *MAB.*) *Subject Headings:* **1. Eclipse effects on sferics 2. Solar eclipse June 1954.**—*Authors' abstract.*

10D–33 551.594.

Ellis, G. R., **On the propagation of whistling atmospherics.** *Journal of Atmospheric and Ter restrial Physics*, London, 8(6):338–344, June **1956.** 6 figs., 2 refs., 13 eqs. **DWB**—It is shown tha the dispersion of whistling atmospherics propagated along the lines of force of the earth's magneti field should be greatly dependent on the geomagnetic latitude of the observing point. The chang in the magnetic field intensity along a line of force produces an upper-frequency limit for whistle propagation which, at latitudes greater than 62°, should fall within the usually observed frequenc region of 1–10 kc/s. Dispersion curves showing this critical frequency are given for geomagneti latitudes 55°, 60°, and 65°. (*Same item as* 7.10–304, Oct. 1956, *MAB.*) *Subject Heading:* **1. Sferic propagation.**—*Author's abstract.*

10D–34 621.396.11:551.596:551.594.

Foldès, G., **Mesure du bruit atmosphérique (Commission IV, XII^{ème} Assemblée Générale d l'Union Radio-Scientifique Internationale).** [Measurement of the atmospheric noise: (Report of Commission IV, XIIth General Assembly of the International Scientific Radio Union.] *L'Onde Électrique*, Paris, 38(376):533–538, July **1958.** 9 refs. **DLC.** Commission IV of the XIIth genera assembly of the International Scientific Radio Union demonstrated that considerable progress ha been made in the measurement and, more generally speaking, the knowledge of atmospheric noises Studies have shown that the log-normal distribution of time or of the probability of exceedin various levels by the envelope of the noise stress only exists at high levels; while at low-levels th distribution tends towards the Rayleigh's law, which arises from the superposition of a great oscilla tions number of random amplitudes and phases. The author also examines the help given by variou national committees and at the end of his study mentions the various resolutions brought forwar by Commission IV. *Subject Headings:* **1. Sferics research 2. Sferics source distribution.**—*A.V.*

10D–35 551.594.11:551.594.

Fuchs, Josef (*Vienna*), **Report on some observations on atmospheric electricity.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 42:135–139, Nov. **1955.** figs. **DLC**—The audio-frequency phenomena of "whistlers" or "sifflements," which can be hear in long wires as a musical tone descending in frequency from several kilocycles to nearly zero cycle within an interval of about one second, was observed at the Sonnblick Observatory (elevation 10,20 ft) continuously over a six-year period. It shows a daily and a yearly fluctuation (Trabert Conrad). Studies of potential-gradient measurements made during times of disturbed weathe have shown distinct characteristics associated with the passage of different types of meteorologica fronts. The form of the potential-gradient curve as a function of time during the passage of col fronts is quite unique and easy to distinguish from that during the passage of warm fronts (Seper Observations of the kind of atmospherics called "grinders" and "clicks" have shown that the former probably resulting from glow discharges, exist only during the earlier phases of the development of thunderstorm, while the latter, resulting from normal lightning flashes, predominate during th storm's main phase and thereafter. Continuous observations of grinders and clicks are therefor a valuable source of information about the electrical state of weather situations and also give in dications about the dynamic processes envolved. (*Same item as* 9.8–273, *MAB.*) *Subject Headings* **1. Whistlers 2. Electricity of disturbed weather 3. Potential gradient measurements 4. Sonn blick, Austria.**—*Author's abstract*

10D–36 621.396:551.594.

Gardner, F. F., **The use of atmospherics to study the propagation of very long waves.** *Philosophical Magazine*, London, 41(323):1259–1269, Dec. **1950.** 6 figs., 4 refs. **DLC**—The "level" integrated atmospherics received on narrow-band receivers tuned to a series of different frequencie between 3.5 and 50 kc/s has been recorded and the results analyzed. The most significant effe is a marked attenuation of waves of frequency below 10 kc/s when travelling over distances of 100 km or more. This attenuation is discussed and is related to the quasi-sinusoidal waveform ofte

ssumed by atmospherics which have travelled great distances. A decrease in the level of atmos-herics has been found to occur during sudden ionosphere disturbances on frequencies below about 0 kc/s. This contrasts with the known increase on frequencies above about 20 kc/s. (*Same item as* D–38, April 1955, *MAB.*) *Subject Headings:* **1. Radio wave propagation 2. Sferics.**—*From uthor's abstract.*

10D–37 551.594.6:621.396

George, T. S., **Investigation of atmospheric radio noise.** Florida. Univ. at Gainesville. ngineering and Industrial Experiment Station, Contract AF 19(604)-876, Final Report, Nov. 15, **957.** 122 p. 65 figs., 8 tables, numerous eqs. **DWB** (M94.6 F636i)—A voluminous statistical eport complete with statistical tables, numerous nomograms and scatter diagrams, wiring diagrams, ecorder records, etc. covering the interference effect of atmospheric noise on radio teletype, radio-elegraph, radiotelephone and multiplex teletype; studies of atmospherics waveforms, a meteoric gnal analyzer, a lightning stroke counter, and VLF ground wave polarization. It is concluded that ne distribution of the noise envelope approximates the log-normal curve, and that it varies directly s a power of bandwidth where the power was approximately 0.34 and compares with the value of .5 for pure fluctuation noise. (*Same item as* 10.1–26, Jan. 1959, *MAB.*) *Subject Headings:* **. Spherics 2. Sferics effects on radio communication systems.**—*M.R.*

10D–38 551.594.6

Goldberg, Philip A., **Electromagnetic phenomena of natural origin in the 1.0–150 c./s. band.** *Tature*, London, 177(4522):1219–1220, June 30, **1956.** 3 figs., 2 refs. **DWB**—Summer observations eastern Oregon of vertical and N-S horizontal field components showed that low-frequency activity as made up of about 20 bursts per sec, each lasting 4–10 msec, of about 10^{-8} gauss in the vertical eld and 3×10^{-7} in the N-S field. The signal level was at a minimum about 7 h WMT, a strong aximum at 14–16 h, a secondary minimum at 21–22 h and a weak secondary maximum at 23–1 h. robably due to lightning. (*Same item as* 7.11–309, Nov. 1956, *MAB.*) *Subject Heading:* **1. Sferics.** *-C.E.P.B.*

10D–39 551.594.6:551.508.86

Grierson, J. Kenneth (*Defence Research Board, Ottawa*), **A technique for the rapid analysis of histlers.** *Institute of Radio Engineers, N. Y., Proceedings*, 45(6):806–811, June **1957.** 2 figs., 3 foot-refs. **DLC**—This paper discusses the design of a new type of sound spectrograph, intended r analyzing whistlers. This instrument is of the single-channel scanning type, but its basic action to scan the frequency-time plane in frequency at a fixed time rather than, as in existing instruments, time at a fixed frequency. The principle is as follows: First, a very short section of the signal to be nalyzed (roughly equal in duration to the reciprocal of the bandwidth of the analyzing filter) is ored in the instrument electronically. The stored signal is then read out repeatedly many times ster than its original speed, and this repeated waveform is analyzed by a variable-tuned filter hich sweeps once very rapidly through the expanded frequency band which the signal now occupies. he varying output from the filter, representing the variations of the amplitude of the signal with equency at one particular time, is recorded as one line of a scan across a continuous strip display. nally, the stored sample of signal is erased, replaced with the next sample, and the whole process peated. An audio frequency spectrograph of this type appears to combine speed of operation th fine resolution in frequency, rendering it useful for the rapid analysis of whistlers. (*Same m as* 9.5–280, May 1958, *MAB.*) *Subject Headings:* **1. Sound spectrograph 2. Whistler recorders Whistler analysis.**—*Author's abstract.*

10D–40 551.594.6:621.396.822:621.317.34

Harwood J. (*Radio Research Station, Eng.*), **Atmospheric radio noise at frequencies between KC/S and 30 KC/S.** *Institution of Electrical Engineers, London, Proceedings, Pt. B*, 105(2):293–0, May **1958.** 9 figs., 2 tables, 4 refs., 11 eqs. Abstract in *Institution of Electrical Engineers, urnal*, 4(41):265, May **1958. DLC**—Measurements of the characteristics of very-low frequency mospheric noise in southern England have been made with automatic equipment during the last v years. The results are described in terms of statistical parameters of the envelope at the output a narrow-bandwidth receiver (300 c/s between 3 *dB* points). The average voltage of the envelope, corded via an integrating circuit with equal charge and discharge time-constants of 8 sec, showed ort-term fluctuations of about 5% and clear diurnal and seasonal variations. The r.m.s. voltage, duced by integration of measured amplitude probability distributions, varied between 4 and 8 nes the average voltage; the values were very dependent on the incidence of large infrequent lses. The noise was always much more impulsive than fluctuation noise. The structure of the velope was described by two forms of distribution, one being the amplitude distribution of the aks of pulses, and the other the conventional amplitude probability distribution of voltage. The mer was represented by a simple power-law function of voltage involving two parameters, the

voltage and the power-law index. The latter was represented by another simple function involvin two similar parameters. The character of the noise was always approximately the same in spite substantial changes of average voltage from time to time. Variations of the intensity and structu with frequency and bandwidth were examined. *Subject Heading:* **1. Radio noise.**—*Author's abstra*

10D–41 551.594.

Helliwell, R. A.; Crary, J. H.; Smith, R. L. (*all, Radio Prop. Lab., Stanford Univ., Stanfor Calif.*), and Pope, J. H. (*Geophysical Inst., Univ. of Alaska, College, Alaska*), **The "nose" whistler a new high-latitude phenomenon.** *Journal of Geophysical Research*, Wash., D. C., 61(1):139–14 March **1956.** fig., 4 refs., 2 eqs. **DLC**—A peculiar type of whistler recorded at College, Alask on July 10, 1955 (65° lat) not detectable by ear is illustrated and the origin speculated on. A gener form of Eckersley's dispersion law gives a predicted form of impulse similar to the observed nos whistlers. The usual whistlers are thought to be the descending portion of nose whistlers. The may give information on conditions in the ring current region and explain the dawn chorus. (*Sam item as* 8.9–327, Sept. 1957, *MAB.*) *Subject Headings:* **1. Nose whistlers 2. Whistlers 3. Sferic 4. College, Alaska.**—*M.R.*

10D–42 551.515.2:551.501.8

Hennessy, J. and Brann, H., **Mass detection methods for tropical cyclone warning purpose** (In: Tropical Cyclone Conference, Brisbane, Queensland, Sept. 1955, **Report.** Melbourne, Burea of Meteorology, [1956?] p. 139–171. 2 figs., 3 tables, 25 refs. Discussion p. 168–171.) **DWB**— This subject is dealt with under the headings of radar, sferics and microseisms. The type of a mospherics direction finding equipment it is proposed to employ in Queensland will sense the occu rence of lightning flashes up to 2000 mi distant and by synchronization of observations from thr stations will determine the location where the flashes originated. An outline of overseas experien is given. (For a fuller abstract, *see* 7J–186, Oct. 1956, *MAB.*) *Subject Headings:* **1. Radar ob servation of tropical cyclones 2. Sferics from hurricanes 3. Microseismic storm tracking.**—*Fro authors' abstract.*

10D–43 551.594.6:551.594.22

Hepburn, F. and Pierce, E. T., **Atmospherics with long trains of pulses.** *Philosophical Magazin* 7 Ser., 45(368):917–932, Sept. **1954.** 9 figs., 4 plates, 2 tables, 12 refs. **DWB**—Long-train sin soidal atmospherics recorded at Cambridge, Eng., are classified into 4 types according to symmet and presence of a slow tail. Height and distance determinations are described and interpretatio discussed. "The variation of pulse amplitude with reflection order is shown to lead to the postulatio of horizontal radiating elements in the channel during the later stages of the return stroke, althou difficulties arise in reconciling this concept with considerations of the magnitude and orientation the horizontal elements." (*Same item as* 6.5–349, May 1955, *MAB.*) *Subject Headings:* **1. Rad noise bursts 2. Lightning.**—*C.E.P.B.*

10D–44 551.594

Hepburn, F., **Wave-guide interpretation of atmospheric waveforms.** *Journal of Atmospher and Terrestrial Physics*, 10(3):121–135, March **1957.** 7 figs., 10 refs., 4 eqs. **DWB**—The preci current variation in the lightning discharge channel and the propagation characteristics of t transmission path for the low-frequency radio waves generated, provide possible explanations of t finer details of recorded electric-field change waveforms and some of the observed anomalies in t application of the pulse-reflection theory to "atmospherics." A graphical construction for t prediction of waveforms, given the source conditions, indicates how the change in shape with r flection order of the ionosphere-reflected pulses can be explained in terms of source effects and t mode responses of an imperfectly conducting infinite parallel-plane wave-guide, whose kno propagation characteristics give a qualitative explanation of the diversity of waveforms record The dependence upon range and time of day provides experimental confirmation of BUDDEN's wa guide approach. One type of waveform, observed during day and night, indicates a directio variation of the propagation factor transcending the diurnal variation over a certain region. *Subj Heading:* **1. Sferics wave forms.**—*Author's abstract.*

10D–45 551.594

Hepburn, F., **Atmospheric waveforms with very low-frequency components below 1 k known as slow tails.** *Journal of Atmospheric and Terrestrial Physics*, 10(5/6):266–287, **1957.** figs., 3 tables, 21 refs. **DWB**—Origin of "slow tails" is discussed. Recent observations of fo magnitude, quasi-period and delay of slow tails are described and their theoretical explanation terms of source and propagation set out. Examples of slow tails are illustrated and diurnal variati with respect to sunset at source plotted. Amplitude increases from day to night, quarter period day and with storm distance. Delay increases more rapidly by day than night and more rapi

an quarter periods. Theory of origin is discussed; day and night ionosphere parameters are aluated for heights of 50–90 km. (*Same item as* 8.10–92, Oct. 1957, *MAB.*) *Subject Headings:* **Sferics wave forms 2. Slow tails.**—*C.E.P.B.*

10D–46 551.594.6

Hepburn, F. (*Physics Dep., Univ. of Nottingham*), **Classification of atmospheric waveforms.** *ournal of Atmospheric and Terrestrial Physics*, London, 12(1):1–7, **1958.** 3 figs., 12 refs. **DLC**—he desirability and requirements of a systematic classification of atmospheric wave forms are scussed. An observational scheme is suggested and interpreted in terms of known properties of ie discharge and propagation mechanisms. This data is reviewed to clarify application of the heme to individual wave forms. The relationship of the classification to previous inadequate oupings is indicated. (*Same item as* 10.1–132, Jan. 1959, *MAB.*) *Subject Headings:* **1. Sferics ave forms 2. Sferics classification.**—*Author's abstract.*

10D–47 551.594.221:551.594.6

Hill, Edward L. (*School of Physics, Univ. of Minnesota, Minn.*), **Very low-frequency radiation om lightning strokes.** *Institute of Radio Engineers, N. Y., Proceedings*, 45(6):775–777, June **1957.** figs., 7 foot-refs., 3 eqs. **DLC**—A theory of the generation of low-frequency electromagnetic adiation by cloud-ground lightning strokes is presented. Only the effect of the return stroke is con-dered. The predicted form of the radiated pulse from the return stroke is a single cycle with a eld variation which varies linearly with time. The spectral distribution of the radiated energy found to be centered at about 11 kc, with a total width at half-maximum of 12 kc. The total ergy radiated in one leader and return stroke is estimated at 220,000 joules. Some qualitative nsiderations on the emission of radiation at extremely low frequencies are given. (*Same item as* 9–309, Sept. 1958, *MAB.*) *Subject Headings:* **1. Lightning strokes 2. Sferics origin.**—*Author's* ostract.

10D–48 551.501.83:551.515.4

Horner, F., **Measurements of atmospheric noise at high frequencies during the years 1945–1951.** reat Britain. *Dept. of Scientific and Industrial Research, Radio Research, Special Report*, No. 26, 953. 40 p. numerous figs., 8 tables. **DWB**—Results of measurements at 20 noise measuring ations in all parts of the world are analyzed for period 1945–51. Year to year, seasonal and diurnal ariations as well as geographical differences are revealed in graphs and text. Various frequencies 2.5, 5, 10, 15 and 20 mc/s) are considered. Changes in methods of prediction for 2.5 and 5 mc/s e indicated as a result of this survey. No changes in 15 and 25 mc range seems necessary. This is ought to be due to the fact that higher frequency noise comes from distant thunderstorms and wer frequencies from more critical local thunderstorm areas. (*Same item as* 9.7–105, July 1958, *AB.*) *Subject Headings:* **1. Sferics from thunderstorms 2. High frequency radio noise.**—*M.R.*

10D–49 551.501.83:551.594.6

Horner, F. (*D.S.I.R., Radio Research Station, Slough*), **The reception of atmospherics at igh frequencies.** *Journal of Atmospheric and Terrestrial Physics*, London, 4(3):129–140, **1953.**) figs., 2 refs. **DWB**—Observation of the amplitudes of atmospherics received in the high frequency and offers a possible method of assessing the distances of their sources. In a preliminary investiga-on of the potentialities of the technique, atmospherics have been recorded simultaneously at two equencies in the upper part of the h.f. band. Reception would be expected at both frequencies om sources within ground-wave range (about 100 km). At rather greater distances, such that the ceiving point is in the skip zone for both frequencies, no reception should be possible. There ould then be a zone from which there should be reception on the lower frequency only, and at eater distances energy should again be received at both frequencies. The preliminary results nform generally with this pattern, and the boundaries of the various zones are in agreement with e ionospheric data derived from vertical incidence soundings. The sources of the atmospherics bserved were located by use of the network of direction finders operated by the Meteorological ffice. It is concluded that the technique forms a basis for routine estimation of the distances of orms and merits further examination to determine more precisely the accuracy which can be hieved and to overcome certain practical difficulties in the observations. (*Same item as* 8.3–96, arch 1957; *MAB.*) *Subject Headings:* **1. Sferics reception 2. Sferics sources.**—*Author's abstract.*

10D–50 551.501.83:551.594.6:551.515.43

Horner, F. and Clarke, C., **Some waveforms of atmospherics and their use in the location of understorms.** *Journal of Atmospheric and Terrestrial Physics*, 7(1/2):1–13, Aug. **1955.** 12 figs., ble, 17 refs. **DWB**—Types of wave forms recorded in S. England are illustrated. They include to 40% of echo forms resulting from successive reflections between earth and ionosphere. Estima-on of source distance from intervals between peaks is more accurate than calculation from simple

reflection theory. A graphical method is described which may be used with about 3% of day a 5% of night records; with improved technique the latter may be doubled. Within a range of 20 km at night and 500 (summer) to 1000 km (winter) by day distance can be determined within 30 (night) to 20% (day) but technique cannot yet replace a network of direction finders. (*Same ite as* 7.1–128, Jan. 1956, *MAB.*) *Subject Headings:* **1. Sferics thunderstorm location 2. Sferics wa forms.**—*C.E.P.B.*

10D–51 551.501.83:551.508.

Horner, F. and Harwood, J., **An investigation of atmospheric radio noise at very low frequencie** *Institution of Electrical Engineers, Proceedings, Pt. B,* 103(12):743–751, Nov. **1956.** 11 figs., 8 ref 9 eqs. **DLC**—Technical aspects of noise measurement for long wave reception; nature of nois average probability and amplitude distribution of voltage peaks; time distribution of peaks; measu ing equipment; pen records, diurnal and seasonal variations in field strength, noise structure, amp tude probability, distribution of envelope and time distribution of major impulses are analyzed a discussed. Examples are cited and illustrated by records and curves for varying situations thunderstorm incidence during July–Sept., 1955 in southern England (Radio Research Statio (*Same item as* 9.7–106, July 1958, *MAB.*) *Subject Headings:* **1. Radio noise 2. Sferics recordi** —*M.R.*

10D–52 551.501.83:551.506.

Horner, F., **The measurement of atmospheric radio noise.** *International Geophysical Ye* 1957/1958, *Annals,* 3:295–314, **1957.** 6 figs., refs. **DWB**—A full summary of the available i formation on methods of measuring atmospheric radio noise is presented in the form of recommen tions regarding the investigation of atmospherics by the International Scientific Radio Union (URS during the IGY. The measurement of the intensity of atmospheric noise and the location of sour of atmospherics by direction finding are primarily discussed. In addition, the enhancement noise at very low frequencies during solar flares and the recording of wave forms are given br treatment. The following topics are covered therein: 1) Nature and origin of atmospheric ra noise; 2) Relationship between noise measurement and waveform recording; 3) The practical i portance of radio noise; 4) Receiver characteristics required for noise measurement; 5) Types measurement in current use; 6) Recording of noise of film and magnetic tape; 7) The presentati of atmospheric noise data; 8) The relationship between atmospheric noise and thunderstor 9) Directional characteristics of noise; 10) Some aspects of noise measurements requiring particul attention; and 11) Summary of recommended observations. The appendix includes a list of reco mendations on the collection of IGY atmospheric noise data and notes on the desirability of standa ization in making these measurements so as to facilitate intercomparison. *Subject Headin* **1. Sferics research 2. IGY sferics program.**—*R.P.*

10D–53 551.594.6:551.59

Horner, F. (*Radio Res. Station, Slough, Eng.*), **Polarization of atmospherics.** *Nature,* Londo 181(4624):1678–1679, June 14, **1958.** 2 figs. **DWB**—A complex type of trace was obtained wit twin-channel cathode-ray direction finder. This paper contains assumptions and deductions on t polarization of the echoes that were received after varying numbers of reflections between earth a ionosphere. It is concluded that the trace can be produced by a vertical discharge to the grou and not by a horizontal discharge channel. *Subject Headings:* **1. Sferics wave forms 2. Polarizati of sferics.**—*N.N.*

10D–54 551.501.83:551.594.2

Horner, F. and Clarke, C. (*both, Radio Res. Station, Dept. of Scient. and Indust. Res.*), **Ra noise from lightning discharges.** *Nature,* London, 181(4610):688–690, March 8, **1958.** 3 fi 2 refs. **DWB**—During a storm on July 19, 1957 the Radio Research Station, Slough, obtai records of the wave form of the vertical component of electric field in a bandwidth of 300 c/s at Mc/s from 25 phases at known distances in the range 1–6 km deduced from the delay in hea thunder. The atmospherics were recorded on magnetic tape at a subcarrier frequency of 10 k Records of wave forms are reproduced and analyzed. Records from ground flashes and record fr a flash at 5 km range appeared to be similar in amplitude and wave form. A study of the h frequency atmosphere in relation to that recorded at very low frequencies, since the latter conta large pulses originating in the return strokes, showed that the wave forms resemble those in earlier storm. The high frequency atmospherics had peak amplitudes between 50 and 1500μ V. and those at very low frequency between 0.3 and 30 V./m. (*Same item as* 10.1–133, Jan. 19 *MAB.*) *Subject Headings:* **1. Lightning waves 2. Sferics from lightning 3. Sferics wave fo 4. Slough, Eng.**—*I.L.D.*

10D–55 551.594.6:551.594.22

Horner, F., **The relationship between atmospheric radio noise and lightning.** *Journal of Atmospheric and Terrestrial Physics*, 13(1/2):140–154, Dec. **1958.** 5 figs., table, refs., 2 eqs. **DWB**—Examination of atmospherics in a bandwidth of 300 c/s at 10 Kc/s from storms of known location in Europe has shown that in median amplitude, amplitude range and frequency of occurrence, they corresponded with what would be expected from lightning discharges to ground. Other experiments in Australia showed that atmospherics from tropical storms had overall durations similar to those of lightning discharges, and consisted of a series of pulses. From their amplitudes it seemed reasonable to suppose that the largest pulses originated in ground strokes but the number of pulses was much greater than would have been expected from ground strokes alone. The smaller recorded pulses were mainly associated with the larger ones, but it is not clear in what part of the lightning discharge they originated. High frequency atmospherics had similar durations to those recorded at very low frequencies, but were more continuous. The start and finish of HF atmospherics tended to coincide with large VLF pulses. The atmospherics were much longer than would have been expected if stepped leader discharges had been the main source. *Subject Headings:* **1. Sferics from thunderstorms 2. Sferics sources 3. Lightning discharges.**—*Author's abstract.*

10D–56 551.508.86

†Imianitov, Il'ia Moiseevich, **Pribory i metody dlia izucheniia elektrichestva atmosfery.** [Instruments and methods for the study of atmospheric electricity.] Moscow, Gosud. Izdat. Tekhniko-teoreticheskoĭ Literatury, **1957.** 433 p. 342 figs., 8 tables, 613 refs., eqs. **DWB** (M94 I32pr)—Chapter 11 (p. 393–433) deals with instruments and methods for measuring thunderstorm electricity and atmospherics. The instruments described include Popov's thunderstorm recorder and various types of radiogoniometers (narrow-band, cathode-ray), with diagrams showing constructions of the instruments and principles of thunderstorm direction and range finding. (For a fuller abstract, see 10.4–6, *this issue.*) *Subject Heading:* **1. Sferics instruments.**—*G.T.*

10D–57 551.508.8 551.510.62:061.3

International Council of Scientific Unions. Joint Commission on Radio-Meteorology, Brussels, Aug. 16–18, 1954. **Proceedings of the 3rd meeting.** pub. **1955.** 30 p. t-p. in French and English. Text in French or English. **DWB**—On p. 18–26 the work of WMO in the field of sferics research is summed up (in French). A report is included on a special meeting held in Zurich in May 1954 of sferics experts delegated by the governments of the United Kingdom, France and Switzerland. Discussions and resolutions of this meeting concerning various applications of sferics observations, comparison of different instruments and methods, international coordination, etc., are summed up. Reference is also made to the most important sources of information on sferics. (For a fuller abstract see 8.5–60, May 1957, *MAB.*) *Subject Headings:* **1. Radio meteorology conferences 2. Sferics research.**—*G.T.*

10D–58 551.501.83:061.3

†International Scientific Radio Union, 11th Assembly, The Hague, Aug. 23–Sept. 2, 1954, **Proceedings, Vol. 10, Pt. 4, Commission 4 on Radio Noise of Terrestrial Origin.** pub. **1955.** 60 p. figs. **DWB**—In addition to minutes of the several sessions, a number of reports concerning observations of sferics in Australia, Canada, France, Germany, Great Britain, Japan, Sweden, Switzerland and the U.S.A. by chairmen of the National Committee of those countries (including A. Ehmert, J. Horner, A. Kimpara, H. Norinder, J. Lugeon and H. Dickson) are included in these Proceedings. Reference to numerous papers on atmospherics, including meteorological aspects as well as recording and radio aspects, are presented by most countries. Resolutions with respect to preparation of revised sferics charts, study of wave forms, IGY program, etc. are appended. (*Same item as* 3–97, March 1957, *MAB.*) *Subject Headings:* **1. Sferics conferences 2. Sferics bibliographies.**—*M.R.*

10D–59 551.594.6:551.508.86

International Telecommunication Union, **Revision des données sur les bruits atmosphériques radioélectriques.** [Revision of the data on the atmospheric radioelectric noises.] Prepared by the International Advisory Committee on Radiocommunication. Its *Report* No. 65, **1957.** 34 pages, figs., 14 refs.—In preparing this report, a greater account was taken of the data gathered during a period of great solar activity than of those relative to a period of weak solar activity. In spite of the reasons which allow us to believe that the phase of the solar cycle will have an influence on the degree of the noise at its reception, it has not been possible to put into evidence a satisfying correlation between the sun-spots and the data available on the noise. As often as possible, the forecasts are based on actual measurements. The report deals successively with basis parameters, graphically presented parameters, factors intervening in forecasts, variations in the degree of the noise within a section, fine structure of the atmospheric noise and use of the data. *Subject Headings:* **1. Solar effects on sferics 2. Sferics data.**—*A.V.*

10D–60 551.501.83:551.594.2

Isikawa, Haruzi and Takagi, Masumi, **On the fine structure of atmospherics from near origin** *Nagoya. University. Research Institute of Atmospherics, Proceedings*, 2:9–25, Jan. **1954.** 15 fig 7 tables, 16 refs. **DWB**—Details in the wave forms of sferics originating in intra-cloud and cloud-t ground discharges are investigated (pulse intervals, pulse amplitude, etc.). It is found that certa types of intra-cloud discharges may generate sferics having wave forms identical with those origina ing from the main strokes of cloud-to-earth discharges. (*Same item as* 6.6–59, June 1955, *MAH Subject Headings:* **1. Sferics wave forms 2. Sferics from thunderstorm 3. Lightning discharge** —*G.T.*

10D–61 551.501.83:551.594.2

Isikawa, Haruzi and Takagi, Masumi, **Interpretation of pulsive waveform of leader stroke (0 the fine structure of atmospherics near their origins, Pt. 2).** *Nagoya, Japan. Univ. Resear Institute of Atmospherics, Proceedings*, 3:29–42, Nov. **1955.** 9 figs., 13 refs., eqs. **DWB**—T similarity in the fine structure of atmospherics produced by a violent cloud discharge and thc produced by the stepped leaders of ground discharges is confirmed in this paper, the only differen between the two types of atmospherics being that the lower limit of the time interval between minu discharge processes is shorter in the case of cloud discharges. *Subject Headings:* **1. Sferics wa forms 2. Sferics from thunderclouds 3. Lightning discharges.**—*G.T.*

10D–62 551.508.94:551.594.2

Isikawa, Haruzi; Kamada, T. and Takagi, Masumi et al., **On the electromagnetic recordi apparata of lightning discharge and some observational results obtained by them.** *Meteorologic Society of Japan, Journal, Ser.* 2, 33(2):45–55, March **1955.** 10 figs., table, 12 refs. In Japanes English summary p. 45. **DWB, DLC**—It is necessary for the study of lightning discharge to obser its effects simultaneously by as various means as possible. To investigate electromagnetic effec of lightning discharge and electrical structure of thundercloud, the authors have constructed seve apparata for the joint observation of thunderstorms, e.g., the lightning counter, the electrostat fluxmeter and the atmospheric wave-form recorder for nearby thunderstorm. The record of lightni counter informs us of the average activity of nearby thunderstorms; and by the simultaneous recor ing of the lightning by using both the electrostatic fluxmeter and the wave-form recorder, we c accurately delineate field-change caused by the discharge, which often has extraordinary compl character, i.e., the duration of which reaches nearly 1 sec., and yet which involves rapid field-chang of the order of 10^{-5} sec. As the result of the thunderstorm observation held in Aug. 1953 at Maeba City, the following conclusion can be pointed out as for the cloud flashes in the dissipating stage thunderstorm: 1. Effective advance velocity of supposed dipole charges in the cloud in the cour of the cloud discharge is found to be very slow, i.e., of the order of 10^{-6} cm/sec. 2. The slow clo discharge is accompanied by the small discontinuous differential type pulses of radiation field cha acter, which can be surmised to result from the small but rapid discontinuous discharges in t course of the same slow cloud discharge. *Subject Headings:* **1. Lightning research instrumen 2. Lightning discharges. I. Kitagawa, N. II. Iizuka, T. III. Murai, K. IV. Kano, M.**—*Autho abstract.*

10D–63 551.501.83:551.594.

Isikawa, Haruzi (*Res. Inst. of Atmospherics, Nagoya Univ.*), **Lightning mechanism and s mospherics radiation.** *Journal of Geomagnetism and Geoelectricity*, Tokyo, 8(4):136–146, Dec. 195 6 figs., 7 tables, 18 refs. **DWB**—Simultaneous recording of electrostatic field change, wave fo of atmospherics and lightning flash photographs, were obtained with partial success during thund storm observation in the summer 1955. The simultaneous records of electrostatic field change a wave form of atmospherics, each pair obtained at the moment of a cloud discharge, have been i vestigated and the possibilities have been suggested that some of the slow discharge processes thundercloud will be mainly composed of corona discharges of various types between two cha centers in the cloud. Wave form of atmospherics and lightning flash photographs, both relati to the same cloud discharge, have made it clear that the very rapid dart leader radiates atmospher with wave form of main discharge type. The directly correlated records of electrostatic field chan and wave form of atmospherics, were also obtained concerning several ground discharges. T has made it possible to classify the recorded ground discharges into two types as the discharge ha type stepped leader, or β type, following to the principle originally reported by SCHONLAND (The investigation indicates that no less than 60% of the recorded ground discharges has β ty stepped leaders in this thunderstorm season. In spite of the insufficient number of available da at present it seems reasonable to consider that the greater part of the ground discharges in c country have β type stepped leaders. It has also been made clear that the streamer emitting outstanding single pulse, such as the return streamer of ground discharge, is always associated w

ondary and somewhat slow discharge processes. *Subject Headings:* **1. Lightning discharges sferics wave forms.**—*Author's abstract.*

10D–64 551.501.83:551.594.221:779

Isikawa, Haruzi; Takagi, Masumi and Takeuti, Tosio, **On the leader waveforms of atmospherics ir the origins.** *Nagoya Univ. Research Institute of Atmospherics, Proceedings*, 5:1–11, March **8.** 6 figs., 6 tables, 10 refs. **DWB**—The authors have adopted the discontinuous method of ording atmospheric wave forms, in which each wave form, singly swept on the screen of respective R.T., is photographed in the respective frame of 35 mm cine film. These techniques have made ossible to perform an uninterrupted recording of wave forms throughout the period of a thunder-rm, often lasting more than several hours, and to deduce statistically more general features mon to a certain type of lightning discharge than the continuous method of recording can do. llowing these views, the authors have made a statistical analysis of wave forms obtained under nderstorm conditions. It has been made clear through the present analysis that: 1) Almost 80% he recorded stepped leaders preceeding ground discharges has been found to be β type, and this iation has not been changed through two years of observation; 2) Positive space charges presumed exist at the thundercloud base really activate the formation of β type leaders, nevertheless, α type ders can often be produced even in such cases where a clear evidence exists that a strong positive ce charge center is present at the cloud base; 3) The nature of the initial portion of a stepped der is the same for both of these types, and the time interval values between two successive pulses this portion clearly reduce from larger values, more than 100μs to normal values, roughly 50μs en the leader steps out of cloud base and develops in the gap between cloud and ground; 4) In ne cases a β type leader, followed by a return stroke, produces a train of small pulsations in its al few ms, just before the return stroke appears. The mean time interval, roughly 20μs, of these sations is clearly smaller than the normal value between step streamers. It is not clear at present ether each of these final pulsations is produced by a step streamer appearing in the last stage of der development, as the Boys' camera photograph of a typical α type stepped leader does not resent any reduction of step intervals throughout the final stage. *Subject Headings:* **1. Sferics ve forms 2. Lightning photographs.**—*Authors' abstract.*

10D–65 551.594.11:551.501.83

Israël, H. and Theunissen, E., **Luftelektrisches Potentialgefälle und Weltgewittertätigkeit—ein itrag zur grossräumigen luftelektrischen Synopsis.** [Potential gradient and world thunderstorm ivity: a contribution to large scale atmospheric electric synopsis.] *Naturwissenschaften* 44(1):8, 1. 1, **1957.** fig., 2 refs. **DWB**—In Sept. 1956 potential gradient and vertical current on quiet hts on Jungfraujoch and Gornergrat were related to records of sferics on 27 kHz at Zurich and yerne, from the Central American thunderstorm region. Close agreement is shown. (*Same n as* 8.5–332, May 1957, *MAB.*) *Subject Headings:* **1. Potential gradient variations 2. Sferics ords 3. Switzerland.**—*C.E.P.B.*

10D–66 551.594(02) 551.501.83

Israël, Hans, **Luftelektrizität und Radioaktivität.** [Atmospheric electricity and radioactivity.] rlin, Springer, **1957.** 125 p. 86 figs., 6 tables, foot-refs. **DLC** (QC961.I8)—In Ch. 6, Sec. 3 96–102), the author describes the mechanism whereby sferics are produced, and discusses the ve forms of atmospherics and their use in ionospheric and lower atmospheric observation. (For uller abstract, *see* 8.9–5, Sept. 1957, *MAB.*) *Subject Headings:* **1. Atmospheric electricity text-oks 2. Sferics.**—*G.T.*

10D–67 551.508.94

Ito, Kichinosuke; Kato, Toshio and Iwai, Akira, **Local lightning flash counter within 20 km.** *goya, Japan. Univ. Institute of Atmospherics, Proceedings*, 3:69–74, Nov. **1955.** 5 figs., 4 otos, 2 refs. **DWB**—Preliminary results of a comparison of eleven different lightning flash nters indicate that a very-low-frequency aperiodic type receiver is suitable for counting lightning hes within a range limited to 20 km. Adaptation to other specified ranges appears to be feasible. *bject Heading:* **1. Lightning counters.**—*G.T.*

10D–68. 551.594.6

Iwai, Akira and Outsu, Jinsuke, **On an investigation of whistling atmospherics in Japan.** *Na-a. Univ. Research Institute of Atmospherics, Proceedings*, 4:29–47, Dec. **1956.** 17 figs., 3 tables efs., eqs. **DWB**—As part of the Study Program of IGY, we have prepared an observation of istling atmospherics. Since Jan. 1956, continuous observations of whistlers have been made Toyokawa (geomag. lat. 24.5°). Simultaneous observations at Toyokawa and Wakkanai (geo-g. lat. 35.3°) were made for one month beginning 13 July 1956. The results obtained in the lysis of the dispersion of whistlers were essentially similar to those reported by STOREY. But,

at Toyokawa, long whistlers, whistler trains and whistler pairs have not been observed, only sh whistlers being observed. The greater part of the observed whistlers occurred in winter; in ot seasons it was scarcely possible to detect them. At Wakkanai, long whistlers and whistler pa have been observed this summer, but whistler trains have not been observed during this peri (*Same item as* 9.4–282, April 1958, *MAB.*) *Subject Headings:* **1. Whistlers 2. Sferics 3. Japan** *Authors' abstract.*

10D–69 551.508.86:551.59

Iwai, Akira and Outsu, Jinsuke, **On an investigation of the field intensity of whistling atm pherics.** *Nagoya. Univ. Research Institute of Atmospherics, Proceedings,* 5:50–52, March 19 5 figs., 4 tables. **DWB**—An apparatus is described and its wiring illustrated (diagrammatically), creating a pseudo-whistling tone to compare with an actual whistler in order to gage the field intens of the latter. The full intensity is calibrated in microvolts/meter and the record can be obtained 1–2 sec by a skillful operator. A "sona gram" of the pseudo-whistling tone generator is illustrat and a typical example of data obtained at Toyokawa on Feb. 12, 1957 tabulated (an unusua frequent series of whistlers). These occurred about sunset on several days in Feb. 1957. It concluded that the frequency and full intensity of whistlers varies greatly with geomagnetic latitu etc. *Subject Headings:* **1. Whistler frequencies 2. Whistler intensity recorders 3. Toyokaw Japan.**—*M.R.*

10D–70 551.501.83:551.59

Iwai, Akira and Outsu, Jinsuke, **On the characteristic phenomena for short whistlers observ at Toyokawa in winter.** *Nagoya. Univ. Research Institute of Atmospherics, Proceedings,* 5:53– March **1958.** 7 figs., 2 refs., 6 eqs. **DWB**—About 84% of short whistlers observed at Toyoka on winter nights were recognized by analysis to be preceded by tweek type atmospherics, wh made it possible to measure distances between the observation station and the sources of sh whistlers. And at Toyokawa in winter, dispersions of short whistlers were found to decrease re larly towards midnight. A variation of electron density in the outer ionosphere is calculated fr this variation of dispersions. *Subject Headings:* **1. Whistlers 2. Sferics propagation 3. Toyokaw Japan.**—*Authors' abstract.*

10D–71 550.3 551.5

†**Japanese national report on terrestrial magnetism and electricity, by the National Commit for Geodesy and Geophysics, Science Council of Japan.** *I.U.G.G. Association of Geomagneti and Aeronomy, Rome, Sept.* 1954, *Transactions,* pub. **1957.** p. 175–188, bibliog. p. 178–188. **DW DLC**—In addition to a bibliography of 247 Japanese papers published in 1950–1953 on geomagnetis geoelectricity, atmospheric electricity, sferics (20 refs), ionosphere, cosmic rays and solar-terrest relationships, this report contains brief notes on Japanese research achievements in each of th fields. *Subject Headings:* **1. Geophysical research 2. Atmospheric electricity research 3. Jap** —*G.T.*

10D–72 551.501.83:551.510.535:551.59

Jean, A. Glenn, Jr.; Lange, L. Jerome and Wait, James R., **Ionospheric reflection coefficie at VLF from sferics measurements.** *Geofisica Pura e Applicata,* Rome, 38:147–153, **1957.** 7 fi 4 refs., 4 eqs. English summary. **DLC**—A method for calculating the complex ionospheric reflect coefficients at VLF using sferic wave forms is presented. The mathematical analysis was carr out for a number of different wave forms to illustrate the method. Reflection coefficients determi from sferics observations were compared with those calculated, using an ionospheric model. In m cases, the agreement with theory is fairly good, although in some cases, reflection coefficients exce ing unity were obtained. The discrepancies are believed to result from horizontally polari flashes rather than limitations in the ionospheric model. *Subject Headings:* **1. Ionospheric reflect coefficients 2. Sferics wave forms.**—*Authors' abstract.*

10D–73 551.501.83:551.515.3:551.59

*Jones, Herbert L., **Research on tornado identification: to study the sferics originating from vicinity of tornadic activity.** Oklahoma Agricultural and Mechanical College. Div. of Enginee Research, Contract DA-36-039-Sc64436. First, 2nd, and 5th to 7th Quarterly Progress Repo Jan. 1–June 30, **1955** and Jan. 1–Sept. 30, **1956.** 5 pieces. 26, 63, 29, 31 and 31 p. figs., tab refs. Also: Final Report, Jan. 1, **1955**–Dec. 31, **1956.** 50 p. figs., tables, refs. **DWB** (M1 J777r)—A number of projects for studying sferics originating in tornado activity areas are repor in detail in this series of studies. Development of equipment, correlation with actually obser tornadoes (in Blackwell, Okla. and Udall, Kan., May 25, 1955, for example), and a comparison results with high (150 kc) and low (10 kc) frequency at Stillwater, Okla. for several severe storms discussed. During a storm on May 30, 1956 the visual strokes from cloud to ground were recor

ographically and found to synchronize perfectly with 10 kc signals. Most of the energy seems e in the high frequency band. (*Same item as* 10B–104, Feb. 1959, *MAB.*) *Subject Headings:* **ornado tracking by sferics 2. Sferics from tornadoes.**—*M.R.*

10D–74 551.501.83:551.508.86

Kamada, Tetsuo and Nakajima, Jun, **The measurement of the intensity of atmospherics, Pt. 1.** *oya. Univ. Research Institute of Atmospherics, Proceedings*, 2:31–39, Jan. **1954.** 13 figs., table, fs. **DWB**—An apparatus for recording intensities of sferics and its methods of operation are ribed. Results obtained with the instrument at the Research Institute of Atmospherics at okawa, Japan, are reported. Data on diurnal, monthly and seasonal intensity variations, on ics intensity as a function of the frequency used and on phenomena connected with sunrise, set and solar flares are presented and interpreted. (*Same item as* 7.1–129, Jan. 1956, *MAB.*) *ject Headings:* **1. Sferics recorders 2. Sferics intensities.**—*G.T.*

10D–75 551.594.6

Kamada, Tetsuo and Nakajima, Jun, **On the direction of arrival of atmospherics at Toyokawa, 1.** *Nagoya. Univ. Research Institute of Atmospherics, Proceedings*, 2:95–101, Jan. **1954.** 22 , 3 refs. **DWB**—As a result of continuous recordings of direction of atmospherics made at the earch Institute of Atmospherics in Japan (137°E, 35°N), monthly and seasonal average direc- al frequency distribution diagrams are presented for the period July 1952–Dec. 1953. (*Same as* 7.1–130, Jan. 1956, *MAB.*) *Subject Heading:* **1. Sferics directional distribution.**—*G.T.*

10D–76 551.501.83:551.508.86

Kamada, Tetsuo; Nakajima, Jun and Takeuchi, Toshio, **On the directive type lightning counter thunderstorm forecast (Studies on recording apparata for thunderstorm observations, Pt. 1).** *oya, Japan. Univ. Research Institute of Atmospherics, Proceedings*, 3:75–83, Nov. **1955.** 10 , table, 3 refs. **DWB**—An apparatus for recording atmospherics according to direction of in is described and its block diagram shown. It consists of a pulse counter, cathode ray direction er, and recording unit. *Subject Headings:* **1. Sferics recorders 2. Lightning counters.**—*G.T.*

10D–77 551.594.6:551.510.535

Khastgir, S. R. (*Wireless Lab., Dept. of Physics, Banaras Hindu Univ.*), **Abnormal polarization he atmospheric pulses reflected successively from the ionosphere.** *Nature*, London, 181(4606): –405, Feb. 8, **1958.** fig., 3 refs. **DWB**—During the determination of the direction of arrival tmospherics by the conventional cathode ray tube direction finder the author observed that occasions, for atmospherics of comparatively distant origin, there were elliptic patterns of lually decreasing eccentricity and till-angle along with one or more linear responses, although n tested with the audio-frequency oscillations from a single generator fed into the aerial system he cathode-ray tube direction finder, the fluorescent screen exhibited only the usual linear re- nses." These elliptic patterns are considered to be "evidences of polarization of the atmospheric es reflected successively from the ionosphere, the linear responses being due to the direct (or und wave) atmospheric pulses." More than forty oscillograms with elliptic patterns were rded during the monsoon months of 1955. "A typical record of the processing ellipses with or six straight lines bunched within a small angle along with the record of the wave form of the ospheric pulses simultaneously taken with the automatic atmospheric recorder" is presented and lyzed. *Subject Headings:* **1. Polarization of sferics 2. Ionospheric reflection of sferics 3. Sferics pagation.**—*I.L.D.*

10D–78 551.508.94:551.501

Kilinski, Erich von, **Die neuen Registrieranlagen im luftelektrischen Hause des Hauptobserva- ums in Potsdam.** [New recording equipment in the building for atmospheric electricity at Potsdam Observatory.] *Zeitschrift für Meteorologie*, 7(5):146–150, May **1953.** 3 figs., 9 refs. **B**—The new apparatus described with the aid of current diagrams and photographs are as ows: an electric field measuring machine for registering potential gradient, a special device for rding electrically charged precipitation and thereby recording the total vertical and precipitation ent, and a device involving the establishment of a potential for an artificially ventilated condensor vided with cylinder shaped external and internal electrodes and a special mast for measuring t current flow in order to determine atmospheric conductivity. The sensitivity of the apparatus ery great and the isolation requirements are slight. *Subject Heading:* **1. Atmospheric electricity ruments.**—*I.L.D.*

10D–79 551.501.83:551.594.6(52)

Kimpara, Atsushi, **The waveform of atmospherics at night.** *Nagoya. Univ. Research Institute tmospherics, Proceedings*, 2:1–8, Jan. **1954.** 3 figs., 25 plates, 6 refs. **DWB**—With a view of

investigating the change of wave forms of sferics with distance, the author discusses the wave f observed simultaneously at Toyokawa, Kumamoto and Akita stations, Japan, in 1952. They classified into 5 groups according to the distance: *A*) more than 4000 km, *B*) 3–4000 km, *C*) 2– km, *D*) 1–2000 km and *E*) less than 1000 km. The investigation reveals that in *A* and *B* the forms depend mainly upon the characteristics of trajectories, in *D* and *E* upon activities in met logical phenomena and in *C* upon both meteorological and propagation conditions. (*Same ite* 6.6–61, June 1955, *MAB.*) *Subject Headings:* **1. Sferics wave forms 2. Japan.**—*From aut abstract.*

10D–80 551.510.535:551.5

Kimpara, Atsushi, **The sudden ionospheric disturbances on 22 November 1952.** *Na Univ. Research Institute of Atmospherics, Proceedings*, 2:40–52, Jan. **1954.** 11 figs., 5 tables. pend. p. 48. **DWB**—Despite the period of lower solar activity, a striking S.I.D. phenomenon observed on Nov. 22, 1952, which revealed the close correlation of solar flare with outbursts of radio waves, Dellinger fadeout in short-wave communication, characteristic crochets in three ponents of magnetograms, fadeout of echoes in ionospheric measurements, and an abnormal inc of the intensity of atmospherics at very low frequencies. The author made a detailed study of relations and found an advance increase of the intensity of atmospherics about an hour befor solar flare. He appends similar results obtained in a more active period (April, May 1952) reference, and discusses their characteristics and correlations. (*Same item as* 6D–249, April *MAB.*) *Subject Headings:* **1. Sferics 2. Solar effects on sferics 3. Ionospheric disturba 3. Solar radio noise.**—*Author's abstract.*

10D–81 551.501.83:551.515.8:551.

Kimpara, Atsushi, **Atmospherics accompanied by cold fronts.** *Nagoya. Univ. Res Institute of Atmospherics, Proceedings*, 2:92–94, Jan. **1954.** 5 figs., 5 refs. **DWB**—As an exa of the connection between sferics and cold fronts, the author discusses and illustrates the pa of a cold front with thunderstorms over Japan on Sept. 3, 1953, and presents records of inte variation and directional distribution of sferics recorded at Toyokawa Observatory. From and other evidence the author deduces that clearly defined cold fronts are generally accompani sferics when they are activated by impinging on the Japanese Islands after passing over the S Japan, or by ascending the central mountain ranges of Japan. In addition to these cold-front sferics, the author mentions those having distant origins and briefly discusses their connection world-wide thunderstorm distribution in fall. (*Same item as* 6.6–60, June 1955, *MAB.*) *S Headings:* **1. Sferics from cold fronts 2. Sferics from distant sources 3. Global thunder distribution 4. Japan.**—*G.T.*

10D–82 551.501.83:551.594.6:551.

Kimpara, Atsushi, **Atmospherics in the Far East.** *Nagoya, Japan. Univ. Research Ins of Atmospherics, Proceedings*, 3:1–28, Nov. **1955.** 46 figs., 7 refs. **DWB**—The author ma extensive series of observations of wave form and direction finding of atmospherics at thre servatories in Japan, from 1952 to 1954. He arranged the results in two parts; in the first h scribes in detail the correlation of origins of atmospherics with thunderstorms, showers, snow st cumulonimbi, cyclones, tropical depressions and storms, typhoons, fronts, troughs in the atmosphere, etc. In the second part he shows the distribution of origins of atmospherics i Far East as well as in the Western Pacific throughout the year, specifically in tropical and tropical Asia and Australia, Indonesia, the China Sea including the Philippines, etc., and gi rational interpretation of the distribution of origins from a meteorological point of view, with s consideration of the convergence of air masses in the intertropical and temperate fronts, th graphic lifting, strong insolational heating effects, etc. *Subject Headings:* **1. Sferics origin 2. S wave form 3. Sferics from air masses 4. Far East.**—*Author's abstract.*

10D–83 551.594.6:551.501.8

Kimpara, Atsushi, **The waveform of atmospherics in the daytime and at night.** *Na Univ. Research Institute of Atmospherics, Proceedings*, 4:1–19, Dec. **1956.** 45 figs., 13 refs. **D** A study based on the author's work in Japan in 1940–44, and since 1950, using a 3-point ne of direction finding stations. Records are analyzed and classified for daytime and nighttime forms and the mechanisms which cause the variations discussed. The wave form of atmosp is said to depend greatly on the propagation conditions so that there is a clear difference be day and night records. In the day there are 1) stepped leader stroke, partial discharge clouds and successive discharges among clouds; 2) return streamer and 3) multiple stroke At night there is 1) the stepped leader, partial discharge and successive discharge; the 2) streamer, 3) the slow tail, and 4) reflection echo type. (*Same item as* 9.8–277, Aug. 1958, *M Subject Headings:* **1. Sferics wave forms 2. Diurnal sferics variations 3. Japan.**—*M.R.*

10D–84 551.501.83:551.594.6(52)

Kimpara, Atsushi and Kimura, Yasuko, **On field intensity recording of atmospherics at 27 kc/s accordance with the recommendation of WMO.** *Nagoya. Univ. Research Institute of Atmos-erics, Proceedings*, 5:21–29, March **1958.** 3 figs., 3 tables, 5 refs. **DWB**—In order to see if ecommendation 40 of working group of WMO in 1957 can be applied satisfactorily to the results ttained in Japan, the authors examined the records of intensity meters of atmospherics at 27 kc/s served continuously in 1957 at Toyokawa station. They found fairly regular behaviors of sferics uich can be reasonably explained by the distribution of sources with seasonal variations as well as the principle of wave propagation. "A" (Sunrise effect) is found generally 20 min. before sunrise, cept in winter where it is found about 2 hrs before sunrise. "B" (First minimum) and "C" ecovery effect) are often found more than once, and also found frequently in the evening. "D" lorning minimum) is found about 2 hrs after sunrise, but sometimes not clearly. "E" (Afternoon uximum) is found about 2 hrs before sunset and sometimes indicates flat maximum. "F" (late nimum) is found within a half-hour of sunset. "G" (Night maximum) is not found in Toyokawa. ter sunset the field intensity of sferics increases gradually and reaches night levels about 2½ hrs er sunset, and keeps its level nearly constant till dawn when "A" is found. "G" should be called unset effects" in Japan. It is due to the difference of distribution of sources between Europe and ia. *Subject Headings:* **1. Sferics intensities 2. Sferics data 3. Toyokawa, Japan.**—*Authors' stract.*

10D–85 551.594.6:551.594.221:621.396.8

Koster, J. R. and Storey, L. R. O., **An attempt to observe whistling atmospherics near the agnetic equator.** *Nature*, London, 175(4444):36–37, Jan. 1, **1955.** 5 refs. **DWB**—According the theory of T. H. BARKHAUSEN and T. L. ECKERSLEY, whistlers are due to dispersion in the nosphere of "clicks" radiated by lightning strokes, and should not occur near geomagnetic equator. Achimota, Gold Coast, no whistlers were detected in 3 yrs (about 16 hrs observation) though ey occurred 1–3 times a minute during the same period in England. (*Same item as* 6.6–343, June 55, *MAB.*) *Subject Headings:* **1. Radio noise 2. Sferics 3. Whistlers 4. Achimota, Gold oast.**—*C.E.P.B.*

10D–86 551.594.6:523.75

Křivský, L. (*Astrophys. Obs. Ondrejov*), **Äusserung der chromosphärischen Eruptionen in den mosphärischen Störungen.** [Manifestation of chromospheric eruptions in atmospheric dis-rbances.] *Bulletin of the Astronomical Institutes of Czechoslovakia*, Prague, 4(6):196, **1953.** tables. **LC**—Correlations between chromospheric eruptions of importance 1, 2 and 3, and sferics on 11 km avelength were statistically analyzed for the period July 1951–Sept. 1952. General results of the alysis are tabulated and briefly commented on. (*Same item as* 8.1–390, Jan. 1957, *MAB.*) *Sub-ct Headings:* **1. Sferics 2. Chromospheric eruptions 3. Solar effects on sferics.**—*G.T.*

10D–87 551.510.535:551.501.83

Lauter, E. A., **Variationen der D-Schichtdämpfung auf 245 kHz.** [Variations of D layer mping on 245 kHz.] *Zeitschrift für Meteorologie*, 7(11):321–330, Nov. **1953.** 18 figs., 19 refs. **WB**—Results of the measurement of reflection coefficient of 245 kHz during midday and in the ening are communicated. The diurnal and annual course of the damping is shown, and the data mpared with other frequencies. The damping values of the D layer have a close relationship to erics and a weak one to geomagnetic activity. A 24-day recurrence tendency is clearly indicated. ne midday values of the damping are 2 nepers in the winter and almost 7 nepers in the summer. *ame item as* 6.1–121, Jan. 1955, *MAB.*) *Subject Headings:* **1. D layer damping 2. Sferics 3. Solar fects on sferics.**—*A.A.*

10D–88 551.501.83:551.510.62(98)

Little, C. G. (*Geophys. Inst., Univ. of Alaska*), **Radio wave propagation in the Arctic.** Alaska. niv. Geophysical Institute, Contract AF 19(604)-1089, Interim Scientific Report, No. 1, Aug. 15, **55.** 74 p. 23 figs., 3 tables, 23 refs.—Research reported in this paper included the study of histlers with special equipment (described and illustrated). Preliminary results of 38 whistler cordings appear to indicate a variation of frequency dispersion with latitude as might be expected om STOREY's theory (1953). It is believed that these are the first observations of whistlers at high titudes. (For a fuller abstract, *see* 9.8–29, Aug. 1958, *MAB.*) *Subject Headings:* **1. Whistlers in rctic 2. College, Alaska.**—*G.T.*

10D–89 551.501.83:551.509.3(94)

Lloyd, S. H. (*Central Office, Melbourne*), **The use of sferics in analysis: a preliminary survey.** *ustralian Meteorological Magazine*, Melbourne, No. 22:1–3, Sept. **1958.** table. **DWB**—A survey made of sferics reported by the Brisbane-Townsville-Charleville network for the period July to

Sept. 1957. It is found that a fairly satisfactory "synoptic" classification of fixes is possible und five main headings, but some fixes appear "anomalous." It is concluded that sferics can make important contribution to analysis in the Australian area, but the present network may not adequate for the purpose envisaged. *Subject Headings:* **1. Sferics source distribution 2. Synop analysis by sferics 3. Australia.**—*Author's abstract.*

10D–90 551.501.83:551.508.86(47

*Loch, B. F., **Uzkosektornaia registratsiia atmosferikov.** [Narrow sector recording of atm pherics.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 58(120):42–46, **1956.** ref., tables, 2 figs. **DLC.** Transl. into English issued by U. S. Joint Publications Research Service, Was D. C., June 3, **1958.** 9 p. **DWB** (M94.6 L812na)—The narrow sector radiolocator of sferics situat at Voeikovo near Leningrad i built on a wave length of 16,000 m. The sector of signal reception 15–20°. Ninety-six rotations of the frame per day are carried out, and twice as many azimuth surveys of sources of sferics. Data are presented on the results of the sferics recordings. The include distribution of activity in the zone of sferics recording by month (May to Sept.) for 19 relative activity based upon the number of sferics received by a narrow sector locator per day duri 1953, daily variation of sferics in the zone of registration, azimuthal distribution of the number sferics during May–Sept. 1953 and duration of existence of the source of sferics. *Subject Headin* **1. Sferics data 2. Leningrad, U.S.S.R.**—*I.L.D.*

10D–91 551.501.83:551.508.

McKerrow, C. A. (*Defence Research Board, Ottawa*), **Some recent measurements of atmosphe noise in Canada.** *Institute of Radio Engineers, N. Y., Proceedings*, 45(6):782–786, June 19 5 figs., 2 tables, 6 foot-refs. **DLC**—Some recent atmospheric noise measurements in the V range have been made in Canada by the Defence Research Telecommunications Establishment the Defence Research Board. The amplitude of the mean logarithmic power (mlp) of atmosphe noise on a frequency of 10 kilocycles has been measured at Ottawa, Ontario (lat. 45.4°N, lo 75.9°W), over a period of one year, beginning in Oct. 1955. The mlp atmospheric noise amplitu has also been measured in the sub-Arctic regions of Canada at Churchill, Manitoba (lat. 58.8° long. 94.2°W), on a frequency of 107 kc for the period Dec. 1955 to August 1956. A brief descripti of the equipment used to obtain these measurements is described. The results of the measureme are presented in the form of a graphical analysis showing the hourly median variations. The measurements are compared with previous measurements made in Canada, and with the estimat values of the National Bureau of Standards, and CCIR predictions of July 1956. (*Same item* 9.7–107, July 1958, *MAB.*) *Subject Headings:* **1. Sferics measurement techniques 2. Sferi recorders 3. Canada.**—*Author's abstract.*

10D–92 551.501.83:551.594.6(4

Maenhout, A., **Distribution en azimut des parasites atmosphériques reçus à Dourbes sur ond kilométriques.** [Azimuth distribution of sferics received at Dourbes on kilometer waves.] *et Terre*, Brussels, 73(11/12):499–505, Nov./Dec. **1957.** 5 figs. **DLC**—The azimuth distribut of sferics received with a Lugeon-Nobile type radiogoniograph tuned on the frequency of 27 K is given for a typical winter month (Dec. 1956) and for a typical summer month (June 1957). T measurements were made at the Geophysical Center at Dourbes, Belgium. *Subject Headin* **1. Sferics data 2. Dourbes, Belgium.**—*A.V.*

10D–93 551.594.6:551.

Malkowski, G., **Über die Lage von Spheric-Peilungen in der 500 mb-Karte.** [On the posit of sferics soundings in the 500-mb chart.] *Archiv für Meteorologie, Geophysik und Bioklimatolo Ser. A*, 10(1):101–106, **1957.** 2 figs., 3 tables, 4 refs. German, English and French summa p. 101. **DWB**—Sferics centers in Europe are classified according to synoptic situation at 500 m The majority (40%) are in low regions, only 1.2% in highs. The frequency distribution is made of two curves, a dynamic (maximum at low pressure) and an "air mass" curve (maximum at tra tions). The positions of centers are also related to divergences and convergences and to w directions. (*Same item as* 9.6–293, June 1958, *MAB.*) *Subject Headings:* **1. Sferics origin 2. Up air pressure.**—*C.E.P.B.*

10D–94 551.594.6:551.50

Malkowski, G. (*Inst. für Meteorologie und Geophysik der Freien Universität Berlin*), **Das Fu störungsminimum vom 9. Dezember 1957.** [Low level of radio disturbances on Dec. 9, 19 *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 10(4):381–386, **1958.** 2 figs., 2 r English and French summaries p. 381. Also his: **Das Funkstörungsmaximum vom 13. Jan 1958.** [High level of radio disturbances on Jan. 13, 1958.] *Ibid.*, 11(1):114–125, **1959.** 6 fi ref., 2 eqs. English and French summaries p. 114. **DWB, DLC**—The synoptic causes of the p

unced radio-disturbance minimum of Dec. 9, 1957 and pronounced maximum of Jan. 13, 1958 studied by means of surface-averaged parameters. *Subject Headings:* **1. Sferics distribution Synoptic conditions for sferics.**—*Author's summary.*

10D–95 551.508.8 551.510.62

†Marshall, J. S. (*McGill Univ.*) and Gordon, W. E. (*Cornell Univ.*), **Radiometeorology.** *Meteorological Monographs* (American Meteorological Society), Boston, 3(12–20):73–113, July **1957.** figs. (incl. photos), 5 tables, bibliog. p. 109–113, eqs. **DWB, DLC**—In this review of developents in radio meteorology during the five year interval 1951–1955, the authors discuss the following bjects: sferics systems including the goniometer and cathode ray direction finder, recent research atmospherics (the use of sferics in detecting tornadoes, wave forms of sferics, etc.); radio field rength beyond the horizon, radio scattering by a turbulent atmosphere, internal reflection of the mosphere for radio waves, the refraction index of the atmosphere for radio waves, synoptic weather id radio propagation, and optical paths; the precipitation patterns observed by radar including splays of rain-shower cells, snow generating cells and trails, meso-scale pattern, tornadoes and ail, synoptic scale phenomena and hurricanes; theoretical and specialized studies in weather radar ch as the weather radar equation, size distribution and the correlation among precipitation paramers, shape coating and polarization of hydrometeors, attenuation, reflectivity as a function of dust id pollen, the bright band, cloud observation by radar, and angels and lightning. (*Same item as* 0.2–18, Feb. 1959, *MAB.*) *Subject Heading:* **1. Radio meteorology.**—*I.L.D.*

10D–96 551.501.83(99)

Martin, L. H. (*Scott Base, Ross Dependency*), **'Whistlers' in the Antarctic.** *Nature*, London, 81(4626):1796–1797, June 28, **1958. DWB**—From Scott Base, the New Zealand IGY Antarctic tation, which is 79°15'S, 294°30'E, approximately 1200 km northeast of the geomagnetic pole and 250 km southeast of the dip pole, observations of the 'bonks,' 'tweeks,' short and long 'whistlers,' histler trains and periods of strong 'sferics' have been made since April 15, 1958. There have been, s yet, no dawn chorus and no record of lightning discharges in high polar latitudes. Whenever ie whistlers and sferics are heard, an intense and electrically active low-pressure area exists some 000 km north of Scott Base. *Subject Headings:* **1. Whistlers in Antarctic 2. Sferics in Antarctic Scott Base, Antarctica.**—*N.N.*

10D–97 551.501.83

Mattern, Günther, **Über Zusammenhänge der Sferics-Tätigkeit im Bereich bei 1000 Hz mit estimmten Wetterlagen.** [On the connection of sferics activity on 1000 Hz with certain weather tuations.] *Annalen der Meteorologie*, 7(1/2):98–101, **1955/56.** 7 figs. **DWB**—Continuous hourly ecords have been made at Frankfurt a.M. of electrical disturbances on about 1000 *Hz*, which limits ecords to about 1000 km. Examples are given with relevant weather charts. The frequency of erics is closely related to the cloud and precipitation development. (*Same item as* 7.6–73, June 956, *MAB.*) *Subject Headings:* **1. Sferics source distribution 2. Frankfurt a.M., Germany.**—*E.P.B.*

10D–98 551.501.83:551.506.22

Morgan, M. G., **Whistlers and dawn chorus.** *International Geophysical Year*, 1957/1958, *nnals*, 3:315–336, **1957.** 8 figs., refs. **DWB**—A detailed account of the available information on ethods of measuring whistling atmospherics is given as supplementary material to the article by . Horner (10D–52). After a general description of the phenomena involved, the following topics re covered with a view toward standardization of measurement observations, equipment, etc,) IGY objectives; 2) Equipment and observing techniques (general, antennae, cathode input, ynamic range, filters, antenna siting-hum, oscillation, calibration, and recording technique);) Data reading and presentation (general, spectrographs, wave form analysis); and 4) A minimum tation. A series of appendices includes an analysis of tweeks, notes on the earth's magnetic field nd on multiple whistlers, and sample tables of subjective data which were recorded as the result of arious observations. *Subject Headings:* **1. Whistlers 2. IGY sferics program.**—*R.P.*

10D–99 551.594.6:551.594.221

Morrison, R. B., **Atmospherics and meteorological research.** *Weather*, 10(5):147–151, May **955.** 3 figs., 10 refs. **DWB**—A brief summary is given of radar and lightning investigations of hunder clouds. The wave form of sferics and their use in locating thunderstorms are described. *Same item as* 6.10–293, Oct. 1955, *MAB.*) *Subject Headings:* **1. Sferics 2. Lightning.**—*C.E.P.B.*

10D–100 551.501.83:551.515.43:551.594.221

Nakai, Taketosi, **The frequency spectrum of atmospherics.** *Nagoya, Japan. Univ. Research nstitute of Atmospherics, Proceedings*, 3:54–62, Nov. **1955.** 8 figs., 6 refs., 10 eqs. **DWB**—A

method of frequency analysis is introduced on the basis of the Fourier integral, and is applied t two types of sferics: 1) the sferics radiated from return streamer of lightning flash in the daytim and 2) the quasi-sinusoidal wave form at night. *Subject Headings:* **1. Sferics frequency analys 2. Sferics wave forms 3. Sferics from lightning.**—*From author's abstract.*

10D–101 551.508.83 551.510.62(4

†§Nasilov, Dmitriĭ N., **Radiometeorologiia: radiometody v meteorologii.** [Radiometeorology radio methods in meteorology.] Moscow, Gosud. Izdat. Tekhniko-Teoreticheskoĭ Lit-y, **195** 215 p. 50 figs., 19 tables, 160 refs. **DLC** (QC973.N2)—In Ch. 1, p. 16–47, the history and presen status of sferics research in Russia and elsewhere is reviewed with emphasis on the different typ of atmospherics as related to their sources of origin, and the use of sferics in synoptic analysis. (F fuller abstract, *see* 9.1–26, 1958, *MAB.*) *Subject Headings:* **1. Radio meteorology 2. U.S.S.R** —*G.T.*

10D–102 551.508.86:621.396

Nawrocki, P. J., **Investigation of atmospheric radio noise.** Florida. Univ., Gainesvill Engineering and Industrial Experiment Station, Contract AF 19(604)-876, Scientific Report, No. 1 Nov. 1, **1956.** 35 p. 13 figs., 8 refs., 22 eqs. **DWB** (M94.6 F636i)—Investigation of the electr magnetic field components (E_z and H_z) of the ground wave from individual sferic pulses is initiate Preliminary experiments indicate that H_z exceeds the theoretical value obtained from SOMMERFELD theory, and that H_z and E_z probably have a common functional dependence upon the distance propagation. (*Same item as* 9.6–294, June 1958, *MAB.*) *Subject Heading:* **1. Radio noise.**—*Author abstract.*

10D–103 551.594.6:551.501.8

Newman, M. M.; Stahmann, J. R. and Anderson, J. R. (*all, Lightning & Transients Re Inst., Minneapolis*), **Recording and classification of thunderstorm atmospherics by counter tech niques.** (In: Conference on Radio Meteorology, Nov. 9–12, 1953, Univ. of Texas, **Supplement t the Proceedings,** V-3, pub. **1954.** 9 p. 5 figs., table, ref.) **DWB** (M94.7 C748p. Sup.)—Nois from whatever source or wave length can be measured by counter analyzers. The rate of ris amplitude, average level and pulse repetition rate are characteristics which can be measured wit some modifications for sferics over other types of noise. Models of counter analyzers are describe and illustrated. Methods of measurement outlined, correlation with actual reduction in intellig bility discussed and equipment, records, and results illustrated in photographs and graphic form It covers a wide range of frequency and the results are easy to read and analyze. (*Same item* 7.7–272, July 1956, *MAB.*) *Subject Headings:* **1. Sferics recording methods 2. Sferics classificatio** —*M.R.*

10D–104 551.594.6:551.594.22

Newman, M. M. (*Lightning & Transients Res. Inst., Minneapolis*), **The lightning discharg propagation mechanism effect on atmospheric waveforms.** (In: Conference on Radio Meteorolog Nov. 9–12, 1953, Univ. of Texas, **Supplement to the Proceedings,** V-5, pub. **1954.** 4 p. 3 figs 2 refs.) **DWB** (M94.7 C748p. Sup.)—The fact that a lightning stroke occurs after a progressiv step-leader process has gone on for some time is important in the building up or shape of wave form of sferics. Laboratory experiments using artificial channels and banks of condensers to simulate th several stages of a progressive stroke, and to record its effects on an oscillograph are described an illustrated along with illustrations of a complex natural horizontal type stroke. (*Same item* 7.7–271, July 1956, *MAB.*) *Subject Headings:* **1. Lightning propagation mechanisms 2. Sferic wave forms 3. Artificial lightning studies.**—*M.R.*

10D–105 551.501.83-551.594

Norinder, Harald, **The wave-forms of the electric field in atmospherics recorded simultaneous by two distant stations.** *Arkiv för Geofysik,* 2(9):161–195, **1954.** 71 figs., 16 refs., eq. **DLC** Numerous records of atmospherics in Vm^{-1} versus μs are presented for two Swedish stations (distan 570 km). Distance to originating thunderstorms varied between 240 and 2400 km. Most freque wavelength for the quasiperiodic variation of predischarge atmospherics is 11 km. Frequent u polar form of main discharges is noted. A typical curve was derived from about 1000 simultaneo oscillograms. A theoretical analysis is presented, based on a simplified model of current variatio in lightning discharges and their reflection from the ionosphere. *Subject Headings:* **1. Sferics wa forms 2. Sweden.**—*A.A.*

10D–106 551.508.86:551.594

Outsu, Jinsuke and Shiga, T., **Calculation of interference error on a crossed-loop type C.R.D.** *Nagoya, Japan. Univ. Research Institute of Atmospherics, Proceedings,* 3:63–68, Nov. **1955.** 2 ref

2 eqs. **DWB**—This paper describes the evaluation of interference error on a crossed-loop type athode ray direction finder. First, an expression of interference error is obtained as a function of mplitude ratio, phase difference and relative direction between the interfering atmospherics and the bserved atmospherics. Next, the mean-square error for a given amplitude ratio is computed asuming that the interfering atmospherics have random phase and bearing relative to the one under bservation. And finally, the mean-square error and the probability of the mean-square error for he observed atmospherics are calculated either from the amplitude-occurrence distribution of tmospherics and the bandwidth of the amplifier or from the time rate of atmospheric noise and the bandwidth. (*Same item as* 9.4–283, April 1958, *MAB.*) *Subject Headings:* **1. Cathode ray direction inders 2. Sferics.**—*Authors' abstract.*

10D–107 551.501.83:551.509.31:551.515.4

Perlat, A., **Comparaison et utilisation des méthodes de repérage des foyers orageux.** [Comparison and utilization of methods of locating thunderstorm centers.] *La Météorologie*, Paris, Ser. 4, No. 39:211–234, July/Sept. **1955.** 11 figs., tables. English and Spanish summaries p. 211. **DWB**—The properties of lightning strokes and resulting forms of sferics, and methods and equipment for sferics observation are reviewed. Radiogoniometric thunderstorm location networks operating in Britain, France (including North Africa) and Switzerland are described, locations of their stations are shown on charts and samples of their results presented. Applications of sferics location in synoptic analysis and in thunderstorm climatology (thunderstorm distribution and frequency variations) are discussed and shown in examples. (*Same item as* 8.3–98, March 957, *MAB.*) *Subject Headings:* **1. Sferics location 2. Synoptic analysis 3. Thunderstorm distribution.** —*G.T.*

10D–108 551.501.83(94)

Phillips, E. F. (*Divisional Off., Brisbane*), **An analysis of atmospherics for June, July and August, 1957.** *Australian Meteorological Magazine*, Melbourne, No. 22:4–9, Sept. **1958.** 3 tables, 2 refs. **DWB**—An account is given of the investigations of the observed weather associated with sferic fixes and the use of these atmospherics as a forecasting aid for the months of June, July and Aug., 1957. By considering the weather at observing stations that are within a distance of 30 mi of the sferic fix, in 55% of the 94 cases that occurred, thunderstorm clouds or some precipitation in the form of showers, rain or drizzle were observed of which 13% of the total observations were identified with actual thunderstorms. In only 4% of cases was the sky less than half clouded. The atmospherics were found to be closely associated with low pressure systems and their associated troughs and front. 69% of the extra-tropical depressions had associated atmospherics which, in the majority of cases, lay in the sector from N to ESE of the centre of the low. A strong and extensive outbreak of atmospherics in an area was usually coincident with a sharp fall of barometric pressure and surface cyclogenesis or frontogenesis. There was an almost complete absence of sferic reports in high pressure systems. *Subject Headings:* **1. Sferics sources 2. Australia.**—*Author's abstract.*

10D–109 551.501.83 551.594.221

*Pierce, E. T. and Wormell, T. W. (*Cavendish Lab., Cambridge Univ.*), **Field changes due to lightning discharges.** (In: **Thunderstorm electricity.** Chicago, Univ. of Chicago Press, **1953.** p. 251–266. 4 tables, 3 figs., refs. (p. 265–266), eqs.)—Summary of work at Cavendish Laboratory, Cambridge, Eng., during the past decade, on lightning field changes and effects caused thereby up to 5000 km distance. Up to 100 km the electrostatic field is dominant. Beyond 500 km the radiation field is appreciable (sferics). Records were obtained with a Wilson sphere as an aerial (in the open). Five types of atmospherics are recognized according to wave form and distance (km) and maximum zero-to-peak magnitudes in volts/m tabulated for each. *Subject Headings:* **1. Sferics wave forms 2. Lightning field changes 3. Electrostatic fields near lightning 4. Cambridge, Eng.** —*M.R.*

10D–110 551.501.83:551.515.4

Pierce, E. T. and Wormell, T. W. (*Cavendish Lab., Cambridge, Eng.*), **Atmospheric wave forms and the location of thunderstorms.** (In: Conference on Radio Meteorology, Nov. 9–12, 1953, Univ. of Texas, **Supplement to the Proceedings,** V-4, pub. **1954.** 4 p. 2 figs., 3 refs.) **DWB** (M94.7 C748 p Sup.)—Observations of wave forms of thunderstorm atmospherics made at Cambridge have been obtained for distances up to 4000 km, mostly to the S.E., S. or S.W. Peaked wave forms (illustrated) are obtained from the S.E. From the S.W. only peaked wave forms were obtained from distances up to 1600 km. Four factors which might explain this anomaly are listed. It is suggested that orientation of propagation path with respect to geomagnetic field is the most likely cause. Ionospheric reflections are considered. Amplitudes vary by 30:1 and estimates of distance from single station may be off 40%. *Subject Headings:* **1. Sferics wave forms 2. Sferics thunderstorm location 3. Cambridge, Eng.**—*M.R.*

10D–111 551.501.83:551.515.4

Pierce, E. T., **Atmospherics as indicators of world-wide thunderstorm activity.** (In: Israël, H. (*ed.*), **Luftelektrizität im A. G. I.: Bericht über die Tagung in Aachen am 11.12. Mai 1956.** pub. Aachen **1957.** p. 28–37. 2 figs., 2 tables, 19 refs., 6 eqs. English and German summaries p. 28. Also: Mattern, G., **Comments,** *Ibid.*, p. 38–40. German and English summaries p. 38.) **DWB?**—The tracing of temporal variations in global thunderstorm activity would be greatly facilitated if atmospherics, originating from anywhere in the world, could be detected at a single receiving station; the paper reviews the possibilities of this being achieved. The signals emitted by lightning flashes are considered; it is indicated how these are modified during propagation, and questions concerning the equipment for receiving the incoming atmospherics are examined. It is concluded that the basic problem could best be solved by observations, either at about 10 kc/s, or below 100 c/s, and that judicious siting of the receiving station would be of great assistance. In the comments by Mattern, in the course of 4 yrs continuous measurement of atmospherics at 1 kc it has been found that, with the sensibility of the receiver used by the author, not only the disturbed weather centers within a radius of 1000 km are reflected but also the daily trend caused by the ionosphere, as well as disturbances of the lower ionosphere. These results render the use of this frequency as indicator for the world thunderstorm activity very difficult. *Subject Headings:* **1. Global thunderstorm activity 2. Sferics thunderstorm detection.**—*Authors' abstracts.*

10D–112 550.3 551.594

†Rapport national [France]. [National report of France.] *I.U.G.G. Association of Geomagnetism and Aeronomy, Rome, Sept.* 1954, *Transactions,* pub. **1957.** p. 123–139. 170 refs. **DWB, DLC**—Progress achieved in France during the period 1951–1953 in the fields of geomagnetism, geoelectricity, atmospheric electricity, sferics, ionosphere, airglow and auroral research is summed up and a list of 170 papers published by French investigators during that period is added. In the field of sferics research, routine measurements made in France, theoretical contributions, and measurements made during the polar expedition of "Commandant Charcot" are reported. *Subject Headings:* **1. Geophysical research 2. Atmospheric electricity research 3. France.**—*G.T.*

10D–113 551.501.83:551.594.6

Reber, Grote, (*Research Corp., New York, N. Y.*), **Between the atmospherics.** *Journal of Geophysical Research,* Wash., D. C., 63(1):109–123, March **1958.** 7 figs., 6 refs. **DLC**—Examination is made of the residual intensity of energy received between the atmospherics at a frequency of 520 kc. The nature of the junction between the earth's and the sun's atmosphere, and the manner in which an electromagnetic wave travels through an overdense ionosphere are briefly described. The way in which an ionospheric shutter opens and closes is explained, plus examples shown and reduced. A celestial component is found at declination −6°, which has a maximum at 2200 hrs right ascension and a minimum at 0700 hrs. The maximum intensity is 4×10^{-20} jansky per steradian. Unexpected variations at night may be due to auroral particles of low energy. Manifestations of strong precipitation static and local atmospherics are described. A few observations were made at 143 kc. *Subject Headings:* **1. Sferics energy 2. Sferics pulse duration.**—*Author's abstract.*

10D–114 551.501.83:551.515.4/8

Reiter, Reinhold, **Annual variations of the atmospherics: existence and explanation of a second maximum in winter, if only strong impulses are counted.** *Journal of Geophysical Research,* Wash., D. C., 61(1):23–26, March **1956.** 2 figs., 2 refs. **DLC**—During a period of five years, impulses of atmospherics have been recorded on the following frequency ranges: Range I, about 10 to 50 kc; Range II, about 4 to 12 kc. Only such impulses are counted and recorded the amplitudes of which exceed the relatively high threshold value of the amplifier. Considering the monthly means of the impulse sum per hour, we note that each of these five years shows two maxima. The first maximum, appearing during the summer months, May to Aug., can be explained easily by the frequency of thunderstorms occurring in central Europe in summer. The second one, however, which appears in winter, is strange. An exact analysis of the large-scale weather processes results in the following: In the fall, the thunderstorm frequency in central Europe and in the Mediterranean regions is lowered because of large anticyclones (Azores high). During the winter months, violent invasions of polar air masses into the Mediterranean basin take place. Thus, moist labile gradients are formed over the relatively warm sea water, which give rise to renewed thunderstorms. These large-scale changes of air masses are the reason for the observed winter maximum. (*Same item as* 8.1–122, Jan. 1957, *MAB.*) *Subject Headings:* **1. Annual sferics variations 2. Sferics from thunderstorms 3. Sferics from air masses.**—*Author's abstract.*

10D–115 551.594(433)

***Reiter, Reinhold (*Farchant, Bavaria, Germany*), Behaviour of atmospheric electric magnitudes recorded simultaneously at seven mountain stations between 700 and 3000 metres above sea level:**

sults of analysis of the fine and the disturbed weather data, with special attention being given to ecipitation and its nitrate and nitrite ion content. Contract AF 61(514):949, Technical Report nnumbered], July 1958. 2 vol. Vol. 1 (163 p.), text. figs., tables. Vol. 2 (178 p.) entirely ples. DWB (M94 R379be)—Values of atmospheric electricity and meteorological data obtained continuous measurement in a dense network of seven stations in the Wetterstein Mts. (northern ps) during June 1956–June 1958 are presented. The elements recorded include potential gradient, earth current, point discharge current, sferics, number of small ions, nitrate and nitrite ion ntent, pH value of precipitation, etc. The data are analyzed extensively. This detailed analysis cludes descriptions of individual typical weather situations (fog, föhn, precipitation, etc.) and rresponding atmospheric electricity recordings. Application of sferics records to thunderstorm recasting is discussed in connection with actual observations, and the conclusion is reached that rics observed in the morning provide a satisfactory means of predicting thunderstorm frequency the same day and up to 2 hrs after midnight, in an area 90 mi around the recording station. ata on correlations between thunderstorm frequency, sferics and solar flares are also presented d discussed. *Subject Headings:* 1. Atmospheric electricity data 2. Wetterstein, Germany. Contract AF 61(514)-949.—*G.T.*

10D–116 551.501.83:551.594.6

Rivault, R. (*Faculté des Sci., Poitiers*), **Caractéristiques des sifflements observés au cours d'une née.** [Characteristics of whistlers observed in the course of one year.] *L'Onde Électrique*, Paris, (362):539–540, May 1957. fig. DLC—Frequency and wave-form characteristics of whistlers re recorded at Poitiers, France. Two types were identified: those of short duration (connected th thunderstorm activity in the Southern Hemisphere) and those of longer duration (preceded an atmospheric of a particular type associated with lightning in the Northern Hemisphere) ave forms of long whistlers would indicate that they are closely connected with the mechanism formation of the sferics which precede them. (*Same item as* 9.8–108, Aug. 1958, *MAB.*) *Subject eadings:* 1. Whistlers 2. Sferics wave forms 3. Poitiers, France.—*G.T.*

10D–117 551.501.83:551.510.62

†Rivault, R., **Perturbations radioélectriques d'origine terrestre (Commission IV, XII^{ème} Assemblée Générale de l'Union Radio Scientifique Internationale).** [Radioelectric disturbances of rrestrial origin: (Report of) Commission IV, XIIth General Assembly of the International Scientific adio Union.] *L'Onde Électrique, Paris*, 38(376):527–532, July 1958. 62 refs. DLC—Report on e results and researches presented by members of Commission IV at the XIIth General Assembly the International Scientific-radio Union. The development mentioned three years ago is now nfirmed by the abundance of new results in connection with whistlers and natural low-frequency issions. Thanks to these phenomena, one can already explore the exosphere which will, in the ar future, be sounded as one now sounds the ionosphere. The author summarizes the results tained in research on parameters modifying the shapes of atmospherics, when studying lightning d whistlers and low-frequency transmissions. He finally explains the researches made in connecon with statistical and goniometrical recording of atmospherics, and also those regarding the eteorological aspects of atmospheric observations. *Subject Headings:* 1. Sferics wave forms Lightning 3. Whistlers.—*A.V.*

10D–118 551.594.6:551.510.62

Sachdev, D. K., (*Radio Propagation Unit, Natl. Physical Lab., New Delhi*), **Study of the atospheric radio noise at 27 and 100 kc/s at Delhi.** *Journal of Scientific and Industrial Research, c. A*, 17(7):262–270, July 1958. 12 figs., table, 8 refs., 2 eqs. DLC—A preliminary report of the servations on VLF atmospheric radio noise being carried out by the Radio Propagation Unit, ational Physical Laboratory of India, New Delhi (28.5°N, 77°E), is presented. Measurements are rrently made at two frequencies, namely 27 kc/s and 100 kc/s. Diurnal and seasonal variations the radio noise indicate appreciable ionospheric attenuation during day-time, and a summer ternoon maximum, possibly associated with local thunderstorms. Noise intensity falls rapidly ring the early morning hours, the 'sunrise time' differing greatly from one day to another. The nrise fall is sharper at 100 kc/s than at 27 kc/s. Long period (2 hr) fading is observed on certain ghts, and is believed to be associated with disturbed conditions in the ionosphere. Particular tention has been given to the study of sudden enhancement of atmospherics (S.E.A.) for which e observations were initially undertaken. It is found that enhancement is observed at both equencies at the time of a solar flare; the effect at 27 kc/s is normally larger and earlier than at 0 kc/s. However, there is no one-to-one correspondence between the S.E.A. and the solar flare. rther, cases have been observed when the S.E.A. at 100 kc/s is found to be larger than at 27 kc/s. om the present observations it is suggested that transition from enhancement to fadeout occurs mewhat beyond 100 kc/s. *Subject Headings:* 1. Sferics propagation 2. Radio noise.—*Author's stract.*

10D–119 551.501.83:551.515.43:551.594.2

Sao, Kazuo, **Frequency spectrum of the daytime waveform of atmospherics radiated from t return streamer of lightning flash.** *Nagoya, Japan. Univ. Research Institute of Atmosphere Proceedings*, 3:43–46, Nov. **1955.** 6 figs., 2 eqs. **DWB**—Using the expression of field intensity very long radio wave by BUDDEN's wave guide mode theory, as well as NORINDER's records of t variation of discharge current of lightning flash with time, the author endeavored to derive t frequency spectrum of the atmospherics radiated from the return streamer. However, the comput results are not in good agreement with the spectrum of atmospherics observed in practice, especia in the higher frequency range. *Subject Headings:* **1. Sferics frequency analysis 2. Sferics wa forms 3. Sferics from lightning.**—*Author's abstract.*

10D–120 551.501.83:551.510.5

Sao, Kazuo and Shiga, Tamenari, **Some considerations of the waveform of atmospherics d to ionospheric reflection.** *Nagoya, Japan. Univ. Research Institute of Atmospherics, Proceedin* 3:47–53, Nov. **1955.** 13 figs., 2 tables, eq. **DWB**—By assuming that the source of atmospher is a single rectangular pulse, that the reflecting layer is a finite conductor sharply bounded a height of 80 km, and that the earth is a perfect conductor, the authors show by numerical co putation how a pulse is transformed into a rather smooth half-wave, and how the calculated wa form is consistent with that observed in practice. Ground wave and the earth's magnetism a neglected in order to simplify the calculations. *Subject Headings:* **1. Sferics wave forms 2. Sfer reflection from ionosphere.**—*From author's abstract.*

10D–121 551.501.83:551.59

Sao, Kazuo and Maeda, Tsuyako, **Special daytime waveform and the distance from its orig** *Nagoya, Japan. Univ. Research Institute of Atmospherics, Proceedings*, 3:110–112, Nov. 19 4 figs., table. **DWB**—Data on some four dozen sferics recorded at the Research Institute of mospherics from June 17 to June 22, 1955 are tabulated. The sferics selected consist of a charact istic oscillation with two well-defined peaks. It is assumed that the first pulse corresponds to t ground wave and the second to the doubly reflected sky wave. Supposing the height of the reflect D layer to be 65 km, the simple reflection theory is found to agree with the observed wave for *Subject Headings:* **1. Sferics wave forms 2. Sferics origin.**—*G.T.*

10D–122 551.501.83:551.510.5

Sao, Kazuo, **Echo type waveforms which appear to exhibit the effect of reflections from t layers in E region.** *Nagoya. Univ. Research Institute of Atmospherics, Proceedings*, 4:86– Dec. **1956.** 13 figs. **DWB**—Nice illustrations are presented for a special type of nighttime sfe wave form recorded in June 1955 and March 1956. In each case, 2 distinct series of peaks or pul are discernible—each representing a reflection between earth and ionosphere by a different mode 545 wave forms studied, 186 or 16% were of this type. It is concluded that peaks represent reflect from a height of 75 and 80 km (HORNER suggests 77 and 85 km). Distances are also comput *Subject Headings:* **1. Sferics wave forms 2. Sferics reflection from ionosphere 3. Japan.**—*M.R.*

10D–123 551.501.83:519

Sao, Kazuo, **Researches in the frequency analyses of waveforms of atmospherics, Pt. 1.** *N goya. Univ. Research Institute of Atmospherics, Proceedings*, 5:12–30, March **1958.** 8 figs., 4 e **DWB**—In order to illustrate the wave forms of atmospherics with the knowledge of pulses radia from the origin and theories of propagation of VLF waves, investigations of the frequency spec obtained with the aid of frequency analyses were proposed. In this field, F. W. CHAPMAN a others observed the responses of a number of narrow-band receivers tuned to various frequenc The results were based on the smooth daytime type of atmospherics originated at known distan up to about 4000 km. From these results they reduced the frequency characteristics of attenuat factors of very long wave propagation. In this paper the author analyzed a number of smooth ty wave forms of atmospherics and tried to investigate the characteristics of frequency spectra. In consideration of wave forms of received atmospherics there are two problems to be considered; f the discharge current wave forms of lightning strokes, secondly attenuation characteristics of pro gation paths. In dealing with these problems, first of all, current wave forms of strokes obser by NORINDER and DAHLE were analyzed. Next the author analyzed the wave forms of receiv atmospherics, not only of smooth daytime type but of general-complicated type. The auth however, only reported the frequency spectra of various types of wave forms of atmospherics a of their sources, because the number of results were not enough to derive further detailed studi i.e., the propagation characteristics of the waves. In addition, a brief description of the freque analyzer used is given here. *Subject Headings:* **1. Sferics wave forms 2. Sferics frequency analys** —*Author's abstract.*

10D–124 551.594.6

Schumann, W. O. and König, H., **Über die Beobachtung von "atmospherics" bei geringsten Frequenzen.** [On the observation of sferics at the lowest frequencies.] *Naturwissenschaften*, 41(8):183–184, April **1954.** 4 figs. **DLC**—Observations at Munich on 1–25 Hz showed 2 types of disturbance, one an almost pure sine wave train with a frequency of about 9 Hz, lasting generally 0.3 to 3 sec. This is more frequent with cloudless sky, 16–18 h in summer, 13–15 h in winter. It sometimes occurs as a uniform persistent (15–30 sec) train, and at sunrise as irregular trains in groups of decreasing amplitude. The second group includes long trains of irregular waves of 3–6 Hz, coming at any hour with low cloud. Neither type occurs after a warming (e.g., föhn), but the second type has a maximum 1–2 days before a föhn situation. (*Same item as* 5.9–315, Sept. 1954, *MAB.*) *Subject Headings:* **1. Sferics wave forms 2. Munich, Germany.**—*C.E.P.B.*

10D–125 551.594.6:551.501.8:551.509.3:551.515.43

Shimakawa, K., **Observations of atmospherics associated with thunderstorm and its application to weather forecasting, [Pt. 1].** *Journal of Meteorological Research*, Tokyo, 9(6):436–440, July **1957.** 6 figs., 4 refs. In Japanese. **DWB.** Also: **Pt. 2,** *Ibid.*, 10(7):603–609, July **1958.** 16 figs., 6 refs. In Japanese. **DLC**—In Pt. 1, sample sferics records are shown and their use in radio-location of thunderstorm centers demonstrated. In Pt. 2, a number of sferics records obtained at Nagoya are presented in juxtaposition with charts, showing close and distant thunderstorm tracks, and with synoptic charts. *Subject Headings:* **1. Sferics source location 2. Thunderstorm forecasting from sferics.**—*G.T.*

10D–126 551.594.6:551.590.24

Skeib, G., **Der Einfluss der Sonnenfinsternis auf die Ausbreitung atmosphärischer Störungen im Bereich von 5 kHz bis 30 kHz.** [Effect of solar eclipse upon the propagation of atmospheric disturbances in the region of 5 kHz to 30 kHz.] *Germany. Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, Veröffentlichungen*, No. 16:24–27, **1955.** 2 figs. **DWB, DLC**—Effect of eclipse noticed in positive deviation of the number of atmospherics on 30 kHz with a lag of 15 min and a very sharply pronounced 100% deviation in the 5 kHz field strength of atmospherics. The latter is difficult to explain, since an opposite effect was expected. No effect was observed in the number of atmospherics on 10 kHz. (*Same item as* 8.1–391, Jan. 1957, *MAB.*) *Subject Headings:* **1. Sferics 2. Eclipse effects on sferics 3. Potsdam, Germany.**—*A.A.*

10D–127 551.501.83:551.515:551.508.4/5

Skeib, Günter; Kaiser, Heinz and Popp, Christian, **Die Peilung atmosphärischer Störungen durch Synchronaufnahme von Richtung und Wellenform.** [Determination of atmospheric disturbances by synchronous recording of direction and wave forms.] *Germany. Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, Abhandlungen*, 7(48):1–51, **1958.** 28 figs., 8 tables, 27 refs., 11 eqs. **DLC**—Results of a two year program of measurement aimed at locating atmospherics by means of a synchronous recording of direction and wave form of electromagnetic pulses at a single station are reported. The apparatus, considerably mechanized for routine operation, is described. Correlations between large-scale weather situations and local distribution of sferics are analyzed statistically and in individual cases. *Subject Headings:* **1. Sferics source distribution 2. Sferics recording methods.**—*Transl. of authors' abstract (G.T.).*

10D–128 551.594.6:621.396.812

Srivastava, C. M., **The propagation of a radio atmospheric.** *Institution of Electrical Engineers, London, Proceedings, Pt. B*, 103(10):542–546, July **1956.** 4 figs., 2 tables, 9 refs., 12 eqs. **DLC**—The smooth oscillatory type of atmospheric is interpreted on the basis of optical properties of wave guides. The pulse is considered to originate from a pilot streamer and to be rectangular with a duration of 100 microsec. The propagation path is the space between the earth and ionosphere, taken as parallel planes. The wave form characteristics are calculated and agree with observation. (*Same item as* 8.3–341, March 1957, *MAB.*) *Subject Headings:* **1. Sferics propagation 2. Sferics wave forms.**—*C.E.P.B.*

10D–129 551.501.83:551.594.221

Steelman, Kenneth C., **Automatic "sferics" telemetering and plotting system.** *Weather Radar Conference, Sept. 1955, Proceedings of the Fifth Conference*, pub. **1956.** p. 221–227. 6 figs. **DWB**—Sferics network locates the sources of electromagnetic radiation from lightning strokes. In this paper the author describes the telemetering and plotting system that has been developed for use with the sferics network. *Subject Headings:* **1. Sferics networks 2. Sferics thunderstorm location.**—*N.N.*

10D–130 551.594.6:551.510.536 551.508.94:551.508.9

Storey, L. R. O., **Whistlers.** *Scientific American*, N. Y., 194(1):34–37, Jan. **1956.** figs **DWB, DLC**—Whistlers differ from radio atmospherics in that they occur at long wave lengths, ar drawn out rather than abrupt (as are clicks) and occur repeatedly at fixed intervals (as echoes do when they are reflected back from the opposite hemisphere via the ionosphere. If they originat in opposite hemispheres, no click precedes whistlers. The theory is explained and illustrated an recorders (sound spectrograph) and records described and illustrated. The timing of the whistler after the lightning click and their length give a clue to the distance travelled, if frequency taken into account. Results indicate that atmosphere (400 electrons/cc) extends up to 7000 m instead of 1500 mi and consists of ionized hydrogen, perhaps picked up by geomagnetic field as earth passes through space. (*Same item as* 8.4–339, April 1957, *MAB.*) *Subject Headings:* **1. Whistler 2. Sferics 3. Height of the atmosphere.**—*M.R.*

10D–131 551.501.83:551.594.

†Sullivan, A. W.; Hersperger, S. P. and Brown, R. F., **Investigation of atmospheric radio noise** Florida. Univ. at Gainesville. Engineering and Industrial Experiment Station, Contract A 19(604)-876, Scientific Report, No. 10, Jan. 20, **1956.** 95 p. 14 figs., 6 refs., 31 eqs. 52 abstract **Atmospheric waveforms bibliog.** p. 45–57 (151 refs.). Also: Sullivan, A. W.; Brown, R. F. an Nawrocki, P. J., Scientific Report, No. 11, April 15, **1956.** 79 p. 22 figs., 3 tables, 25 refs., 26 eq **DWB**—In Report No. 10 the effect of atmospheric noise on a radioteletype system is discussed and statistical model presented. Waveforms received from 380 mi are analyzed at source and at th receiver and the noise peaks found to be distributed according to a log-normal distribution law a the receiver but not at source. A bibliography on p. 45–57 lists 151 references of which 52 ar abstracted or summarized (at some length) on p. 58–92, and an author index appended. The iten are classified according to: (1) lightning discharge mechanisms, (2) electromagnetic radiations fro lightning and (3) ionosphere and propagation of sferics. In the second report the correlation between the performance of the teletype and the noise distribution functions are examined an studies of VLF ground-wave polarization begun. (*Same item as* 10.1–27, Jan. 1959, *MAB.*) *Subje Headings:* **1. Radio teletype noise 2. Sferics 3. Sferics bibliographies.**—*M.R.*

10D–132 551.501.83:551.508.8

Sullivan, A. W. and Nawrocki, P. J., **Investigation of atmospheric radio noise.** Florida. Univ at Gainesville. Engineering and Industrial Experiment Station, Contract AF 19(604)-876, Scientif Report, No. 14, Oct. 1–Dec. 31, **1956,** issued Feb. 15, **1957.** 28 p. 9 figs., 2 eqs. **DWB**—In vestigation of the E_z and H_z field components present in the ground wave of sferics is continuin Modifications were made in the H_z waveform recorder to insure identical frequency and pha response for both E_z and H_z in the 10 kc to 100 kc range. Measurements of the ratio H_z/E_z tende to substantiate the interpretation of this ratio as a measure of the deviation of the lightning chann from the vertical. The final design of a recorder for automatically sampling the duty cycle ar number of individual bursts exceeding arbitrary levels of received meteoric signal is described detail. *Subject Headings:* **1. Sferics research 2. Ground wave.**—*Authors' abstract.*

10D–133 551.508.9

Sullivan, A. W. and Wells, J. D. (*Univ. of Florida, Gainesville*), **A lightning stroke counte** *American Meteorological Society, Bulletin*, 38(5):291–294, May **1957.** 4 figs., 3 refs., eqs. **DWB DLC**—The design of a simple, compact and inexpensive electronic counter for registering the numb of lightning strokes occurring within known area is presented. Performance of the counter w compared with a visual observation of lightning activity with approximately 96% of the strok being registered. Use of weather radar equipment indicated the ability of the counter to dete storms at ranges up to 100 mi. *Subject Heading:* **1. Lightning counters.**—*Authors' abstract.*

10D–134 551.501.83:551.508.

Takagi, Masumi and Isikawa, Haruzi, **The waveform recorder of atmospherics radiated fro short distance origin.** *Nagoya. Univ. Research Institute of Atmospherics, Proceedings*, 4:48–5 Dec. **1956.** 11 figs., 3 refs. **DWB**—An apparatus has been designed to record the wave forms atmospherics, the sources of which are distributed roughly within the range 0–100 km from th observing station. The apparatus is capable of recording the wave form of an atmospheric simu taneously in three ways. These give the 2 m-sec single time sweep wave form representing fi structures, the 20 m-sec single sweep wave form showing general features, each of which is phot graphed on the respective frame of 35 mm film, and the wave form representing the whole structu of field variation and being recorded on 16 mm cine film running continuously. Another recorde registering the highest peak voltage appearing in the duration of the individual atmospheric, attached to the apparatus to monitor the operation of the apparatus. In the present paper t

onstruction and the performance of the apparatus are described in detail. (*Same item as* 9.7–109. uly 1958, *MAB.*) *Subject Heading:* **1. Sferics wave form recorders.**—*Authors' abstract.*

10D–135 551.594.6:551.510.535

Tantry, B. A. P. and Srivastava, R. S. (*both, Banaras Hindu Univ., India*), **Polarization of atmospheric pulses due to successive reflections from the ionosphere.** *Journal of Geophysical Research*, Wash., D. C., 63(3):527–538, Sept., **1958.** 6 figs., 3 tables, 9 refs., 16 eqs. **DLC**—In determining the direction of arrival of atmospherics by using a "crossed"-loop cathode-ray tube direction-finder, it was found that, on occasions, in addition to the usual straight-line responses on the oscillographic screen, there were elliptic patterns of gradually decreasing eccentricity, size, and tilt-angle. The observed elliptic patterns are considered as due to the abnormal polarization of the atmospheric pulses reflected successively from the ionosphere, while the linear responses are due to the direct atmospheric pulses. It has been shown in the paper how from the observed polarization ellipses and the orientation of the linear response, the polarization characteristics of the atmospheric pulses reflected successively from the ionosphere can be determined. On analysing the observed patterns, it is found that, in general, the phase-difference between the normal and abnormal components increases gradually with the increasing order of reflection. It is suggested that the observed straight lines in the D/F pattern, bunched within a small angle, are due to the radiation pulses originating at the branching points of a long horizontal or slightly inclined lightning channel from one cloud to another. The approximate calculation from the observed angular width of the bunch of straight lines has shown that the horizontal length of the channel is consistent with SHIPLEY's observations of horizontal lightning channels along the lower edge of a cloud. *Subject Headings:* **1. Sferics propagation 2. Polarization of sferics 3. Ionospheric reflection of sferics.**—*Author's abstract.*

10D–136 551.594.6

Tantry, B. A. P. and Srivastava, R. S., **Waveforms of atmospherics with superimposed pulses recorded with an automatic atmospherics recorder.** *Journal of Atmospheric and Terrestrial Physics*, 13(1/2):38–42, Dec. **1958.** 5 figs., refs. **DWB**—The automatic atmospheric recorder constructed and used by the authors is briefly described. Of the various types of superimposed pulses recorded with its help, the "stepped" pulses from a lightning source, superimposed on the waveform due to a different lightning discharge, has not been observed by previous investigators. Superimposed pulses, reflected successively from the ionosphere, are shown, where the superimposed pulses and the waveform on which they are superimposed originate from two different lightning sources or from the same lightning discharge. The "hook"-components of MALAN and SCHONLAND have also been recorded. *Subject Heading:* **1. Sferics wave forms.**—*Authors' abstract.*

10D–137 551.508.86:551.594.6

Taylor, W. L., **Description of recording equipment to be used in the study of whistling atmospherics.** *U. S. National Bureau of Standards, NBS Report*, No. 3559, Nov. 30, **1955.** 25 p. 9 figs. **DWB**—The discovery, nature and cause of whistlers (atmospherics that bounce back and forth from opposite hemispheres along magnetic lines of force via the ionosphere) are reviewed and equipment designed by the National Bureau of Standards for use in a project which they are setting up to verify STOREY's theory (by installations in Bermuda and the Falkland Islands), described and illustrated. Simultaneous recordings will be made for a 3–5 min period every 30 min for 12–24 hrs, two or three times a week. Magnetic tapes will be analyzed at Stanford University. (*Same item as* 8.8–317, Aug. 1957, *MAB.*) *Subject Headings:* **1. Whistlers 2. Whistler recorders 3. Whistler stations 4. Falkland Islands 5. Bermuda.**—*M.R.*

10D–138 551.594.11:551.501.83:551.515.4

Theunissen, Ernst, **Potential gradient and sferics (Atmospheric electric results and global thunderstorm activity: a contribution to large area synoptical investigations).** Germany. Deutscher Wetterdienst (Aachen Met. Obs.), Contract AF 61(514)-640, Technical Note No. 10, **(1957).** 54 p. 13 figs., 6 tables, 16 refs., 5 eqs. **DWB** (M194 A111t)—WHIPPLE's and SCRASE's theory regarding the connection between potential gradient and world thunderstorm activity is based on the mean temporal fluctuations' coordination of the two quantities. Proof for the dependence is still lacking in single instances because the determination of the world thunderstorm activity is still connected with difficulties. In this report we try to compare the figures of the sferics at the time of the highest activity of Central American thunderstorm activity and their variations from one night to the next, as measured in Zurich, with the undisturbed potential gradient that was measured on the Pacific and in the high Alpine stations. Usually the correlation is not too good. We show the reason to be the fluctuations of the sferics' expansion conditions; these fluctuations make indistinct the correlation between potential gradient and world thunderstorm activity. With the aid of the available sferics material, efforts are made to find a scale for the at-

tenuation's changes in the stratosphere. Thus we find that the apparent (registered) thunderstorm activity above the Pacific—as far as it still remains within measuring range—furnishes a good scal for the attenuation fluctuations. With its help, a correcting factor for American thunderstorm activity is established, and it appears that the correlation can, in almost all cases, be considerabl improved through this correction. *Subject Headings:* **1. Potential gradient-thunderstorm correlatio 2. World thunderstorm activity 3. Sferics from thunderstorm.**—*Author's abstract.*

10D–139 551.501.83(729

§*U. S. Air Weather Service, **Final report on the AWS Sferics Evaluation Project (1951).** It *Technical Report*, 105-102, Aug. **1954.** 152 p. 165 figs., table, 6 refs. **DWB**—This manual contain a summary of many of the important results of the "Sferics Evaluation Project" initiated by SVERR PETTERSSEN in 1950 and begun on Feb. 1, 1951, using the facilities of the Air Weather Servic Caribbean Sferics Net with stations in Puerto Rico, Bermuda, MacDill Air Force Base (Florida and Robins Air Force Base (Georgia). Also a station at Fort Monmouth (N. J.) was used. Numer ous monthly sferics distribution charts (June 1950–May 1952), synoptic charts showing relatio of fixes to cold and warm fronts, and other charts correlating data obtained are included in the 16 figs. Equipment is illustrated, data presented in tables and useful relations between sferics fixe and fronts given in a series of generalizations for use of analysts and forecasters. In summer th relationships are clear; in winter close attention must be paid to isolated fixes. (*Same item a* 9.8–10, Aug. 1958, *MAB.*) *Subject Headings:* **1. Sferics Evaluation Project 2. Caribbean sferic network. I. Jensen, C. E. II. Petterssen, Sverre.**—*M.R.*

10D–140 551.510.535:551.510.62:551.508.8

Wait, J. R. and Howe, H. H. (*both, Natl. Bur. of Standards, Boulder, Colo.*), **The waveguide mod theory of VLF ionospheric propagation.** *Institute of Radio Engineers, N. Y., Proceedings*, 45(1):95 Jan. **1957.** 2 figs., 5 refs., 3 eqs. **DLC**—The lower boundary (earth's surface) is a sharply bounde isotropic medium, but the upper boundary (the ionosphere) is a diffuse anisotropic medium. How ever, for frequencies around 16 kc or less it can be assumed that both boundaries are sharp an isotropic, so a simple solution of the wave guide mode theory becomes possible under certain assump tions (vertically-polarized field at large ranges). Geometrical path calculations, integrated fo complex patterns or modes, and allowing for curvature of earth and conductivity of ground (a very important factor) lead to attenuation rate curves and calculations (as examples) of actual lon distance propagation cases. The detailed calculations will be presented in a later paper. Th dependence of sferic wave forms on geographic location is said to be due to influence of groun conductivity on dominant mode. (*Same item as* 9.8–160, Aug. 1958, *MAB.*) *Subject Headings* **1. Wave guide mode theory of VLF propagation 2. VLF radio wave propagation 3. Sferics propaga tion.**—*M.R.*

10D–141 551.501.83:551.509.3

Watson, Bruce F. and Bauer, Siegfried J. (*both, Signal Corps Eng. Labs., Fort Monmouth, N. J.*) **Sferics patterns and associated meteorological conditions.** *Weather Radar Conference, 6th, Cam bridge, Mass., March 26–28, 1957, Proceedings*, pub. **1957.** p. 157–163. 3 figs., refs. **DWB** (M01.8 R124pc)—Sferics data obtained from a three station network are investigated in conjunction wit synoptic and aviation weather information. In order to make best use of all available sferics in formation (including two-station-fixes), selection rules for two-station-fixes are devised leading to more reliable sferics pattern corresponding to thunderstorms and areas of strong convective activity Samples of such an analysis for different weather conditions are presented and interpreted. Result of this analysis indicate that sferics data (including two-station-fixes) represent a valuable tool fo weather analysis and forecasting, especially for areas where no weather data are available. *Subje Headings:* **1. Sferics data 2. Weather forecasting.**—*Authors' abstract.*

10D–142 551.594.6 621.396.

Watt, A. D. and Maxwell, E. L., **Measured statistical characteristics of VLF atmospheric radi noise.** *Institute of Radio Engineers, N. Y., Proceedings*, 45(1):55–62, Jan. **1957.** 15 figs., table 18 refs., 4 eqs. **DLC**—Instrumentation for measuring the cumulative distribution of the amplitude and spacings of pulses in the instantaneous envelope of the atmospheric noise field strength is de scribed. In general, the VLF atmospheric noise observed at 22 kc in a 1-kc band during the fall o 1955 from 9°N to 71°N lat. was found to have a maximum variation in average power level, includin the effects of both time and geographic location, of about 46 db. The dynamic range of the in stantaneous noise envelope, measured during a 20- to 30-min period of time, is defined to be th ratio of the field strength exceeded 0.0001% of the time to that exceeded 90% of such periods of time This dynamic range in a 1-kc band, for the 66 periods measured, varied from 59 to 102 db. Th average dynamic range in the Arctic was 68 db and in the tropics 81 db. The noise envelope at th low amplitude levels is found to be Rayleigh distributed, while that at the higher levels approache

a distribution having a much greater change in level for a given change in probability. In general, at higher levels the spacing between pulses does not appear to be random at temperate and Arctic locations, but the noise pulses observed in the tropics appear to be more randomly spaced. When the bandwidth of the receiver is reduced, the dynamic range approaches 21.18 db, the value expected for the Rayleigh distributed envelope resulting from a thermal noise input. The bandwidth at which this occurs will depend on the character of the atmospheric noise at the time of observation, but appears from our measurements at 22 kc to be approximately 0.2 cycle per sec. *Subject Headings:* **1. Radio noise 2. Sferics data.**—*Authors' abstract.*

10D–143 551.501.83:551.508.86

Watt, A. D. and Maxwell, E. L. (*both, Nat'l Bureau of Standards, Boulder, Colo.*), **Characteristics of atmospheric noise from 1 to 100 KC.** *Institute of Radio Engineers, N. Y., Proceedings,* 45(6):787–794, June **1957.** 18 figs., 10 foot-refs., 3 eqs. **DLC**—The results of some preliminary statistical measurements of the envelope of narrow band atmospheric noise are presented for a range of center frequencies from 1 to 100 kc. The variation of level and dynamic range, as a function of frequency is examined and compared with results expected on the basis of lightning discharge spectra, thunderstorm distribution, and propagation phenomena. (*Same item as* 9.7–110, July 1958, *MAB.*) *Subject Heading:* **1. Sferics data.**—*Authors' abstract.*

10D–144 551.501.89:550.385

Watts, J. M. (*Nat'l Bur. of Stand., Boulder, Colo.*), **Audio-frequency electromagnetic hiss recorded at Boulder in 1956.** *Geofisica Pura e Applicata,* Rome, 37:169–173, **1957.** 4 figs., 3 refs. **DLC**—Hissing noise is very frequently heard on receivers used for detecting whistlers during geomagnetic disturbances. This phenomenon may be associated with the "dawn chorus" or whistlers, but is distinct from either and also from sferics. The energy is concentrated in narrow band widths that fluctuate, giving a surging rather than a steady hissing effect. Relative amplitude of the hiss, compared with the geomagnetic field records, is shown graphically. The hissing begins about 8 hrs after the rapid commencement of the storm. Records show the peak energy of the hiss was near 3 kc. Variations in spectra of hiss frequency are illustrated by numerous reproduced records from March–Dec. 1956; hissing was heard on 9 out of 15 major magnetic storms recorded at Boulder, Colo., at Sunset Field Station. (*Same item as* 10.1–134, Jan. 1959, *MAB.*) *Subject Headings:* **1. Hisses and geomagnetic storms 2. Sunset Field Station, Boulder, Colo.**—*M.R.*

10D–145 551.594.6:551.501.83

Weil, Joseph; Newman, M. M. and Stakmann, J. R., **Correlation of thunderstorm atmospheric measurements.** (In: Conference on Radio Meteorology, Nov. 9–12, 1953, Univ. of Texas, **Supplement to the Proceedings.** V-2, pub. **1954.** 11 p. 6 figs. [incl. photos].) **DWB** (M94.7 C748p Sup.).—A joint program has been planned for correlating waveshape lightning sferics measurements made at Socorro, N. Mex., Minneapolis, Minn., and Gainesville, Fla., by the respective laboratories using oscillographs. Frequency, duration, spacing, shape and polarity of impulses are considered. Synchronization (timing by telephone or radio) for 3 stations in the triangle presents problems whose solution is suggested. Photographing the screen, crystal clock and receiver output simultaneously is one method of assuring synchronized results. Line delay between stations can be corrected by known procedures. (*Same item as* 8.1–392, Jan. 1957, *MAB.*) *Subject Headings:* **1. Sferics networks 2. Sferics recording correlation 3. Minneapolis-Socorro-Gainesville triangle.**—*M.R.*

10D–146 551.510.5:538.3

Wells, W. B., **Upper atmosphere studies by means of low-frequency electromagnetic waves.** *U. S. Navy. Electronics Laboratory, San Diego, Calif., Report* 311, Dec. 9, **1953.** 72 p. 32 figs., 2 tables. **DWB**—Electromagnetic measurements were conducted on two consecutive days of each month from April 1950 through Feb. 1951, except May and Nov., to study the propagation properties of the upper atmosphere. The receiving site was located near Gila Bend, Ariz. Photographic records of oscilloscope traces (A-scan) were taken of signals from distant lightning discharges (sferics) and of echoes from pulse soundings on 196 kc at vertical incidence. Sferics (of frequencies between approximately 5 and 20 kc) at oblique incidence are refracted from heights of 82 to 92 km at night. Pulse soundings at vertical incidence, on a frequency of 196 kc, indicated average nighttime virtual heights of reflection between 76 and 120 km. No significant correlation was found between the data obtained on the electromagnetic studies and those on acoustic studies conducted in the same area. (*Same item as* 6D–298, April 1955, *MAB.*) *Subject Headings:* **1. Upper air studies 2. Electromagnetic wave propagation 3. Sferics.**—*Author's abstract.*

10D–147 551.509.54:551.594.6

Wittmann, Johann, **Über die prognostische Verwendung von Messungen der atmosphärischen Störungstätigkeit im Längstwellenbereich.** [Practical application of measurements of atmospheric

VLF disturbance activity to forecasting.] *Meteorologische Rundschau*, 6(3/4):54–57, March/April 1953. 3 tables, 8 refs. **DWB**—Development and approach of thunderstorms and showers are preceded, generally by several hours, by an increase of disturbances in region 5–12 kHz. These apparently originate in static discharges and give a measure of instability. They indicate the *possibility* of thunder or showers. (*Same item as* 6.2–85, Feb. 1955, *MAB.*) *Subject Headings:* **1. Precipitation forecasting 2. Radio noise.**—*C.E.P.B.*

10D–148 551.501.9:551.501.83

§†World Meteorological Organization, **Atmospherics techniques.** Its *Technical Note*, No. 12; *WMO* (*Pub.*) No. 44. TP. 17, **1955.** 42 p. 11 figs., 4 tables, 35 refs. **DWB**—A general survey of the synoptic, operational and observational aspects of sferics, with brief notes on the history, definitions of terms and a bibliography of some of the most comprehensive or most recent works in this field. Observational techniques, equipment and uses in aviation and electrical or radio engineering in the U. K., France and Switzerland, and by the U. S. Air Weather Service, are treated more extensively with illustrations of equipment, networks, sferics charts (of Western Europe), and synoptic examples (with charts) of analyses using several sferics reports for evaluation and comparison of techniques. Several comparisons were made (by the British, Swiss and U. S. Air Weather Service) of the various systems (Cathode Ray Direction Finder or CRDF and Narrow-Sector Recorders or NSR), with conclusion that the CRDF gives results in 2 min comparable to those of the NSR which requires 20–30 min but less staff and less attention. The CRDF is used by British, French, U. S. Air Force and in Germany, Japan and Sweden. The NSR system is used in France, Switzerland and N. Africa. It is recommended that sferics tests be extended to tropical areas and that networks be set up which cross national boundaries. (*Same item as* 7.11–18, Nov. 1956, *MAB.*) *Subject Headings:* **1. Sferics networks 2. Sferics techniques 3. Western Europe.**—*M.R.*

10D–149 551.501.9:551.509:550.3:061.3

World Meteorological Organization, **International Geophysical Year, 1957/1958, Meteorological programme: Lists of stations.** Its *OMM/WMO* (*Pub.*), No. 58. *AGI/IGY.* 2, **1957.** 108 p. T-p. and text in French and English. **DWB**—This monograph contains a list of 95 countries participating in the IGY meteorological program and of stations of various categories arranged by hemispheres, regions (continents) and index numbers. The several categories are: 1) surface synoptic, 2) upper air synoptic, 3) radiation, 4) ozone and 6) sferics stations. Categories Nos. 5) atmospheric electricity, 7) nuclear radiation and 8) atmospheric chemistry stations were not ready for publication at this time. Types of instruments and observations are given, in some instances, in addition to the coordinates of the stations. (*Same item as* 9.3–26, March 1958, *MAB.*) *Subject Headings:* **1. IGY meteorological networks 2. IGY sferics networks 3. IGY ozone networks.**—*M.R.*

SUPPLEMENTARY MATERIAL

10D–150 551.501.83

Dinger, Harold E. (*Naval Research Lab., Wash., D. C.*), **Report on URSI Commission IV Radio noise of terrestrial origin.** *Institute of Radio Engineers, Proceedings*, 46(7):1366–1372, July **1958.** Also in: *National Research Council, Publication*, No. 581:102–114, **1958. DWB, DLC**—Commission IV deals with study of sources, propagation and effects of atmospherics, whistlers, dawn chorus and other VLF emissions of natural origin. Nine sessions were held, dealing with whistler and other VLF emissions, use of atmospherics to investigate propagation phenomena, IGY projects, atmospheric sources, characteristics of noise and relation between source and atmospheric. These subjects are discussed and 6 resolutions on various aspects presented in detail. *Subject Headings:* **1. Sferics research 2. Whistler research.**—*M.R.*

10D–151 551.501.83

Mattern, G., **Tonfrequente Sferics als Wetterelement.** [Audio frequency sferics as a weather element.] *Zeitschrift für Meteorologie*, Berlin, 11(12):368–371, Dec. **1957.** 4 figs. **DWB, DLC**—The results of a four year study on the relationship between sferics in the audiofrequency range and weather processes carried out at the Institute of Meteorology and Geophysics of the University of Frankfurt and at the Taunus Observatory are reported. The apparatus is described with the aid of a diagram. The receiver at Taunus Observatory was a 170 m long L-antenna attached to three masts 15 m above the ground. The sferics are conducted by means of an insulated cable to an amplifier. A diurnal variation controlled by the ionosphere is observable also in the audiofrequency region; the ionosphere limits the range to 1,500 km at midnight and to around 500 km at midday. These distances hold only for normal undisturbed states in the low ionosphere and for normal non-

storm bad weather processes. The mean daily totals of audiofrequency sferics for January, April and June 1957 are presented on a graph. In each month frequencies decrease in the morning hours before sunrise and begin to increase again after a minimum is reached between 8 and 10 o'clock. The curves differ for each month. January lacks an afternoon maximum, April has a distinct maximum and June has a predominant afternoon maximum. These characteristics are determined by the atmospheric electricity activity of bad weather situations. The deviation of the hourly means of sferics from 12 and 24 o'clock for the period Jan.–Dec. 1957 are analyzed. The 12 o'clock values show a minimum in Feb. and irregular maximum in summer and a drop towards winter. The 24 o'clock audiofrequency sferics are more even in the various months. As in other sferics phenomena, summer showers extending far aloft as well as immediate thunderstorms have the greatest effect. A satisfactory relationship was established between the intensity and number of recorded audiofrequency sferics and the magnitude of the precipitation. *Subject Headings:* **1. Sferics distribution 2. Synoptic conditions for sferics 3. Germany.**—*I.L.D.*

10D–152 551.501.83

Mezősi, Miklós, **A sferics meteorológiai alkalmazásáról.** [Use of sferics in meteorology.] *Időjárás*, Budapest, 62(4):228–230, July/Aug. **1958.** 3 figs., refs. **DWB**—In view of the establishment of a sferics recording service in Hungary planned for 1959, the author gives a brief summary of current sferics measurement techniques and applications of such measurements. European services now in existence are listed and a few special problems are mentioned, such as biological effects of sferics, ionospheric research by means of sferics wave forms, and detection of nuclear explosions and estimation of their size by means of sferics. *Subject Headings:* **1. Sferics 2. Nuclear explosion detection 3. Hungary.**—*G.T.*

10D–153 551.501.83

Morgan, M. G. (*Dartmouth College*), **Correlation of whistlers and lightning flashes by direct aural and visual observation.** *Nature*, London, 182(4631):332–333, Aug. 2, **1958.** 6 refs. **DWB**—This note is based upon author's positive observation at Hanover, N. H. at 0215 Z, May 27, 1958 and several earlier and negative observations. He concludes that lightning flashes can generate whistlers but in most cases they do not. *Subject Headings:* **1. Whistlers 2. Sferics from lightning 3. Hanover, N. H.**—*W.N.*

10D–154 551.594.6

Nakai, Taketoshi, **Atmospheric noise study by measurement of the amplitude probability distribution.** *Nagoya Univ. Research Institute of Atmospherics, Proceedings*, 5:30–49, March **1958.** 21 figs., 3 refs., 10 eqs. **DWB**—The cumulative probability of amplitude in the envelope of atmospheric noise was measured at the output of a narrow-band receiver at 50 kc/s. The level of integrated atmospherics was recorded at the output of the receiver at the same frequency. The band width of the receiver was about 1,000 c/s. The departure from a single logarithmic-normal distribution was investigated. The description is given of the type of the amplitude distribution. The description is given of a calculation which was made to determine the effect that the departure from a single logarithmic-normal distribution has on the total noise power. The curves derived from this calculation may provide a useful means in estimating the R.M.S. value of the noise amplitude. The description is given of a calculation which was made to investigate the behavior of short-time fluctuations of the probability measured. The results may provide a means of estimating a pulse spacing of the larger amplitude. Various parameters have been derived from the amplitude distributions. The description is given of these parameters and the diurnal change of each parameter is shown, and the level of integrated atmospherics is compared with the R.M.S. value derived from the amplitude distribution. *Subject Heading:* **1. Sferics amplitude distribution.**—*Author's abstract.*

10D–155 551.501.83:551.510.535

Skeib, Gunter, **Über die Genauigkeit der Bestimmung von Reflexionshöhen und Entfernungen atmosphärischer Störungen aus ihrer Wellenform.** [Precision of determination of reflection heights and distances of atmospheric disturbances from their wave form.] *Zeitschrift für Meteorologie*, Berlin, 11(5/6):129–135, May/June **1957.** 2 figs., 8 tables, 2 refs., 28 eqs. **DWB, DLC**—SCHONLAND's formula for determining the height of the reflecting ionospheric layer (H) and the distance (D) of the lightning discharge from the point of observation are subject to errors which are the result of the fact that the precision of the temporal fixation of the echo impulse in the wave form of the disturbance has a finite limit owing to the resolving capacity of the instrumentation and irregularity in the reflection process. Equations are developed for determining the mean error of H and D when the values of p, q, r (impulses), τ_1 and τ_2 (time differences between impulses) and D and H are taken from a wave record. Data on the mean error of D and H for different combinations of p, q and r for the specific wave record are presented. Also equation for computing the mean error

of D and H from non-dimension values of p, q, r and D/H are derived and tables with data of $N\left(\frac{ct_n}{H}+\frac{D}{H}\right)=N=\sqrt{4n^2+\left(\frac{D}{H}\right)^2}$ and values $\partial H/\partial\tau_1$ $\partial H/\partial\tau_2$ and δH for different combinations of p, q, r and for different values of D/H are presented. Also the errors arising as a result of fast determination of the order number in the wave form are discussed. *Subject Headings:* **1. Ionospheric height determination from sferics 2. Sferics propagation.**—*I.L.D.*

10D–156 551.501.83:551.515.3/4

Snyder, Louis Archie, Jr., **Investigation of convective activity by means of sferics.** College Station, Texas, Jan. **1958.** Thesis (Ms.)—Texas Agricultural and Mechanical College. 82 p., figs., tables, 13 refs. (Original unchecked)—A detailed analysis of convective activity areas was made considering sferics and synoptic data and corresponding radar film sequences. Ten storms were selected for analysis from sferics data and radar films. Five storms were analyzed in great detail, and 5 storms were examined mainly for supporting evidence and clarification. Sferics data were used to locate areas of convective activity, and radar film for the corresponding times and areas were examined for verification of the sferics data. Sferics intensities were examined for possible severe weather indications by means of the Jones and Dickenson theories. It was hoped that synoptic data in conjunction with sferics and radar data would reveal information concerning the usefulness of sferics in detecting, tracking, and forecasting convective activity. Although a large percentage of the areas of convective activity were detected with present equipment, there still appears to be a number of areas and storms escaping detection. Further research into the frequencies of sferics produced by convective activity is needed to uncover an optimum frequency. The Dickson-McConahy mean time curve method appeared to be valid for early detection of severe storms. Jones' method has the drawback that one is not sure of the intensity of the cell under radar and sferics surveillance. The Dickson method of detection of tornadoes and of other severe weather by sferics "bursts" appears acceptable once an optimum frequency has been discovered. *Subject Headings:* **1. Sferics thunderstorm location 2. Sferics tornado detection 3. Severe storm analysis.**—*ASTIA abstract.*

10D–157 551.594.6

Tantry, B. A. P. and Srivastava, R. S. (*both, Banaras Hindu Univ.*), **Preliminary studies of the energy spectrum of near atmospherics over the frequency range 3–15 kc/s.** *Journal of Scientific and Industrial Research*, Secs. B and C, New Delhi, 17(2):47–51, Feb. **1958.** 4 figs. (incl. photo), table, 4 refs. **DLC**—The energy spectrum of near atmospheric pulses has been investigated by the tuned amplifier method. Narrow band amplifiers, tuned to different sets of frequencies within the range 3 to 15 kc/s were employed to obtain simultaneous responses of the individual atmospheric pulses. The sinous wave patterns delineated on the oscillograph screens were focussed by suitable lenses on a photographic film. The wave form pattern of the same atmospheric pulse was also recorded simultaneously employing an automatic atmospherics recorder. The distances of the sources of atmospherics were obtained from the time intervals between the successive pulses reflected from the ionosphere. The study of the relative amplitudes of the wave patterns shows that, for most of the atmospherics recorded near the source, the amplitude distribution has a maximum between 8 and 10 kc/s. The low frequency tuned amplifiers and the automatic atmospherics recorder are briefly described. *Subject Headings:* **1. Sferics energy 2. Automatic sferics recorders.**—*Authors' abstract.*

10D–158 551.594.6:551.506.22

Whistlers and related phenomena. *American Geophysical Union, Transactions*, 38(6):1011–1016, Dec. **1957. DWB**—Naturally occurring audio frequency radio waves are sometimes received on an antenna. These can be amplified and fed to a transducer and then converted into long descending whistling sounds. A brief history of its discovery in Austria (1886) as well as the development of whistler theory is given in this paper. During the IGY the U. S. IGY program was formulated in order to observe whistlers, and sferics, at frequencies up to 30 kc/sec, and related phenomena. Details of the program are included. *Subject Headings:* **1. Whistlers 2. U. S. participation in IGY 3. IGY sferics program.**—*N.N.*

PART III. REVIEWS, TRANSLATIONS, RECENT MONOGRAPHS, AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of **Meteorological Abstracts and Bibliography.**

A. REVIEWS OF IMPORTANT METEOROLOGICAL MATERIAL

American Academy of Arts and Sciences: **Atmospheric explorations—papers of the Benjamin Franklin Memorial Symposium,** ed. by Henry G. Houghton. M.I.T. Technology Press and Wiley, N. Y.; London, Chapman and Hall, 1958. 125 p. illus. Review by R. G. Fleagle in *Science*, Wash., D. C., 128(3326):711, Sept. 26, 1958.

Beer, A., *(ed.)*: **Vistas in astronomy.** London, Pergamon Press, 1955–1956. 2 vol. (1170 p.) Review by B. Vorontsov-Vel'iaminov in *Astronomicheskiĭ Zhurnal*, Moscow, 35(3):496–498, May/June 1958.

Cook, Reginald G.: **Weather record chart and calendar.** London, Edward Mortimer, 1958. 24 p. Review by R. E. Booth in *Meteorological Magazine*, 87(1933):220, July 1958.

Pedelaborde, P.: **Les moussons** [Monsoons]. Paris, Armand Colin, 1958. 208 p. Review by S. R. Eyre in *Geographical Journal*, London, 124(4):568, Dec. 1958. *(For abstract on this title, see* 10.2–8, Feb. 1959, *MAB)*

Smith, L. P.: **Farming weather.** London, Nelson, 1958. 208 p. Review by L. C. W. Bonacina in *Geographical Journal*, London, 124(4):568, Dec. 1958. Review in *Royal Meteorological Society, Quarterly Journal*, 84(362):479, Oct. 1958.

Stoker, J. J.: **Water waves.** N. Y., Interscience Publishers, 1957. 567 p. figs. Review in *Geofisica Pura e Applicata*, 39:234, 1958.

B. TRANSLATIONS AND RECENT MONOGRAPHS

TRANSLATIONS

Bagrov, N. A.: **Method of the evaluation of forecasts.** (Transl. of the original Russian, **Metod otsenki prognozov,** in *Meteorologiia i Gidrologiia*, Leningrad, No. 4:24–28, April 1955. illus.) Transl. available DWB (M09.3 B148m) *(For abstract on original Russian, see* 7.9–115, Sept. 1956, *MAB)*

Chandrasekhar, Subrahmanyan: **Perenos luchistoĭ energii.** (Transl. of the original English, **Radiative transfer.** Issued Oxford, Clarendon Press, 1950. 393 p. figs., refs., eqs.) Transl. ed. by E. S. Kuznetsova, pub. Moscow, Izdatvo Inostrannoĭ Literatury, 1953. 431 p. figs., etc. Available DLC (QB461.C467) *(See* 4.9–2, Sept. 1953, *MAB)*

Kratzer, Albert: **Klimat goroda.** (Transl. of the original German, **Das Stadtklima** [City climate], 2d ed. enl., pub. Brunswick, Vieweg, 1956. 184 p. figs., tables, refs.) Transl. ed. by E. E. Mikhelevich, pub. Moscow, Izdatvo Inostrannoĭ Literatury, 1958. 238 p. figs., etc. Available DLC (QC866.K716) *(See* 8.8–15, Aug. 1957, *MAB)*

Moscow, Universitet. Geograficheskiĭ Fakul'tet: **Compilation of information on the activities of the Geographical Faculty of the Moscow University on the IGY, No. 1.** (Transl. of the *table of contents* of the original Russian, **Informatsionnyĭ sbornik o rabotakh geograficheskogo fakul'teta moskovskogo gosudarstvennogo universiteta po mezhdunarodnomu geofizicheskomu godu, I,** issued Moscow, 1958. 298 p. figs. and tables.) Transl. by David Kraus issued by American Meteorological Society under Contract AF 19(604)-1936, Dec. 1958. 2 p.

Fizika kosmicheskikh lucheĭ: sovremennye dostizheniia, I. (Transl. of original English, **Progress in Cosmic Ray Physics, Vol. 1,** pub. North-Holland Publ. Co., 1952. Ed. by John Graham Wilson et al.) Transl. pub. Moscow, Izdatvo. Inostrannoĭ Literatury, 1954. 437 p. figs., tables, refs., eqs. Available DLC (QC485.W497) *(See* 10.3–1, March 1959, *MAB)*

Sapozhnikova, Serafima A.: **Microclimate and local climate.** (Transl. of original Russian, **Mikro klimat i mestnyĭ klimat,** issued Leningrad, Gidrometeoizdat, 1950. 239 p. charts, diagrs tables, graphs, eqs.) Transl. available DWB. 501 p. tables, etc. (*See* 3.7–10, Aug. 195 *and* 8D–61, April 1957, *MAB*)

Shumskiĭ, P. A.: **Principes de glaciologie structurale.** (Transl. of original Russian, **Osnovy struk turnogo ledovedeniia** [Basic structural glaciology], issued Moscow, Akademiia Nauk SSSR 1955. 491 p. figs., bibliog.) Transl. by J. Pietresson de Saint-Aubin and A. Bauer issue as *Paris. Centre d'Etudes et de Documentation Paléontologiques, Annales*, No. 22, Oct. 195 304 p. figs., etc. Price fr. 10.000. (*See* 9.10–12, Oct. 1958, *MAB*)

RECENT MONOGRAPHS

Aïzenshtat, Boris A.: **Klimaticheskoe opisanie Golodnoĭ Stepi** [Climatic description of the Golodnay Steppe]. Leningrad, 1958. 73 p. figs., tables. Available DLC (QC990.R92G6)

Akademiia Nauk SSSR. Institut Okeanologii: **Problemy khimii moria** [Problems of the chemistr of the sea]. Its *Trudy*, Vol. 26, 1958. 246 p. figs., charts, tables, bibliogs. Availab DWB (P Vol. 26)

Benton, Mildred, (comp.): **Literature of space science and exploration.** *U. S. Naval Researc Laboratory, Bibliography*, No. 13, Sept. 1958. 264 p. Available DWB (016.629 T5851i)

Forrester, Frank H.: **1001 questions answered about the weather.** Illus. with photos and drawing by James Macdonald. N. Y., Dodd, Mead, 1957. 419 p. bibliog.

Frazier, Paul W.: **Antarctic assault.** N. Y., Dodd, Mead, 1958. 237 p. 30 photos. Availab DWB (999 F848an), DLC

Ivanov, Nikolaĭ Nikolaevich: **Atmosfernoe uvlazhnenie tropicheskikh i sopredel'nykh stran** [A mospheric humidification of tropical and adjacent countries of the world]. Leningrad, 195 311 p. figs., maps, tables, bibliog. Available DLC (QC915.I85)

Jelley, J. V.: **Čerenkov radiation and its applications.** Published for the United Kingdom Atom Energy Authority. N. Y., Pergamon Press, 1958. 304 p. figs., tables, bibliog., eqs. Pric $10.00.

Otnes, Jacob: **Rainfall analyses in the Rufifi Basin.** *East Africa High Commission. Rufifi Basi Survey. Hydrological Section, Progress Report*, No. 4, Sept. 1957. 57 p. figs., tables, refs eqs. Reproduced from typescript. Available DWB (M79.4 E13pr)

Soares, Firmino Antonio: **O clima e o solo de Timor: suas relações com a agricultura** [Climate an soil of Timor: its relation to agriculture]. *Portugal. Junta de Investigações do Ultrama Estudos, Ensaios e Documentos*, Vol. 34, 1957. 118 p. figs., tables, refs. French and Englis summaries. Available DLC (QC990.T5S6)

Williams, C. B.: **Insect migration.** London, William Collins, 1958. 235 p. illus.

C. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Acta Geophysica Polonica, Warsaw, Vol. 6, No. 4, 1958

Lugeon, Jean: **Mon amitié pour Antoni Bolesław Dobrowolski,** [My friendship for Anto Bolesław Dobrowolski], p. 313–320

Nedelkov, I. P.: **Quick-acting models for interpretation of gravity anomalies,** p. 321–330

Adamczewski, I. and Dera, J.: **Badania skażeń radioaktywnych powietrza i wód opadowych rejonie wybrzeża Gdańskiego,** [Investigations on air and water contamination by radi active fallout in the Danzig littoral region], p. 331–361

Lambor, Julian: **Powódź w dorzeczu Bugu i Narwi w kwietniu 1958 roku,** [The flood on the Bu and Narew Rivers, April 1958], p. 362–371

Yeh, Tu-Cheng: **Obecny stan meteorologii w Chinach,** [General state of meteorology in China p. 372–377

Słomka, Jan: **O pracach z zakresu aktynometrii i optyki atmosfery, prowadzonych w Białowie podczas M.R.G.,** [Work in the field of actinometry and of atmosphere optics at Białowie during I.G.Y.], p. 378–383

Gryglewicz, Zofia: **Aktywność sejsmiczna 1957r,** [Seismic activity, 1957], p. 384–393

Ołpińska-Warzechowa, Kazimiera and Szewczyk, Ewa: **Polska bibliografia MRG,** [Polish IG bibliography], p. 394–396

Kalinowska, Z.: **Świder three-hour range indices K and magnetic character-figures C f April to June 1959,** p. 397

Czyszek, W.: **Hel three-hour-range indices K and magnetic character-figures C for April June 1958,** p. 398

Laska, M.: **Średnie dobowe stany Morza Bałtyckiego w Zatoce Gdańskiej-kwiecień, maj, czerwiec 1958 r,** [Mean daily levels of the Baltic Sea in the Gulf of Danzig, April–June 1958], p. 399

cta Hydrophysica, Berlin, Vol. 5, No. 2, 1958

Li, Fu-Tu: **Die Regulierung des Hwangho,** [Regulation of the Hwangho River], p. 81–102

kademiia Nauk SSSR, Izvestiia, Ser. Geogr., No. 1, Jan./Feb. 1957

Girs, A. A.: **Epokhal'nye preobrazovaniia form atmosfernoĭ tsirkuliatsii i sviazannye s nimi kolebaniia urovnia Kaspiĭskogo moria,** [Epochal transformations of forms of atmospheric circulation and associated oscillations of levels of the Caspian Sea], p. 102–108

No. 5, Sept./Oct. 1957

Problema teplovogo i vodnogo rezhima Zemnoĭ poverkhnosti i ee znachenie dlia fizicheskoĭ geografii, [Problem of the hydrothermal regime of the earth's surface and its importance to physical geography], p. 77–103

Pokrovskaia, T. V.: **Nauchnaia sessiia Glavnoĭ geofizicheskoĭ observatorii im. A.I. Voeĭkova po problemam meteorologii prizemnogo sloia vozdukha,** [Scientific session on problems of the meteorology of the air layer near the ground, at the Main Geophysical Observatory], p. 139–142

No. 1, Jan./Feb. 1958

Agupov, A. V.: **Ozera-pokazateli izmeneniia uvlazhneniia territorii rechnykh basseĭnov,** [Lakes as indicators of water balance changes in river basins], p. 48–60

Grishin, I. S.: **Vliianie erozionnogo raschleneniia na raspredelenie snezhnogo pokrova v basseĭne r. Dona,** [Influence of erosive dissection on snow cover distribution in the Don Basin], p. 91–97

Averkiev, M. S.: **Raschet vozmozhnykh summ priamoĭ solnechnoĭ radiatsii s uchetom razlichnoĭ prozrachnosti atmosfery,** [Calculation of possible sums of direct radiation, taking into account the degree of atmospheric transparency], p. 98–101

Pashinskiĭ, Ia.: **O klimatologicheskikh issledovaniiakh Instituta geografii Pol'skoĭ Akademii Nauk,** [Climatological investigations by the Institute of Geography of the Polish Academy of Sciences], p. 155–156

No. 2, March/April, 1958

Ivan'kov, P. A.: **Oledenenie Kamchatki,** [Glaciation of Kamchatka], p. 42–53

merican Meteorological Society, Bulletin, Vol. 40, No. 1, Jan. 1959

Godske, C. L.: **Information problem in synoptic meteorology: Presidential address on the occasion of the Scandinavian-American Meteorological Meeting, June 19–25, 1958, in Bergen, Norway, celebrating the 40th anniversary of the polar-front theory,** p. 1–9

Vol. 40, No. 2, Feb. 1959

Anderson, L. J.: **Hot-wire anemometer for laboratory and field use,** p. 49–52

Daniels, Glenn E.: **Safety deflation device for large captive balloons,** p. 53–55

Tepper, Morris: **Mesometeorology: the link between macroscale atmospheric motions and local weather,** p. 56–72

Hilst, Glenn R. and Nickola, Paul W.: **On the wind erosion of small particles,** p. 73–77

Fawcett, Edwin B. and Snellman, Leonard W.: **300-mb isotach analysis,** p. 78–84

Jehn, K. H.: **Recognition of competence in weathercasting—the AMS seal of approval program,** p. 85–88

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Beebe, Robert G.: **Notes on Scottsbluff, Nebraska, tornadoes, June 27, 1955,** p. 109–116

Hoecker, Walter H., Jr.: **History and measurement of the two major Scottsbluff tornadoes of June 27, 1955,** p. 117–133

Smith, Warren: **Mesoanalysis of a tornado-producing situation in Texas, May 25–26, 1955,** p. 134–145

Neumann, Gerhard: **Notes on the stress of light winds on the sea,** p. 146–148

Petersen, Gerald A.: **Results of various prognostic techniques tested by the weather forecast superintendent course, AAR 25300, Chanute Air Force Base, Illinois,** p. 148–149
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